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Thesis

MENTAL TEST VARIATIONS AMONG DULL CHILDREN

Submitted by

Alice Gilman

(B.S., Teachers College, Columbia University, 1940)

In partial fulfillment of requirements for
the degree of Master of Education

1941

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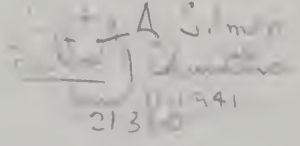

ACKNOWLEDGEMENTS

The author wishes to express her sincere appreciation and thanks to Dr. Donald D. Durrell, for his guidance and assistance during this study.

She also wishes to make most grateful acknowledgement to Mr. George Bemis, Superintendent of Schools, Salem Massachusetts, and to Mr. Ernest Stephens, Deputy Superintendent of Schools, Lynn Massachusetts, the principals and teachers of special classes in these cities for their assistance in securing the data on which this study was made.

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INTRODUCTION

STATEMENT OF PROBLEM

CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM.

This is a comparative study of a variety of factors. First of all, it is a further study into the language comprehension skills of dull children, made by studying the relationships between various tests of mental capacity,. together with a test of reading achievement.

A second study will be made of the relationship between mental age derived from the Stanford Revision of the Binet-Simon Test, and mental age derived from the Durrell-Sullivan Reading Capacity Test, when each is used as a criterion to judge reading retardation.

To diagnose school failure, both intelligence and reading tests are administered to ascertain how far below the child's capacity, he is achieving. Reading ability has been widely considered the criterion for school success or failure. Mental tests and reading achievement tests are often used interchangibly as measures of success in school.

Yet by definition, the intelligence test measures native capacity, estimating the ratio between capacity and achievement. While again by definition, reading tests measure school training.

All intelligence tests are largely measures of language comprehension, based on tests of reading and writing ability.

Even in the Stanford-Binet Test, many items are either influenced by reading, or demand information ordinarily derived from reading although the test itself does not require reading ability. Nearly all group intelligence tests are tests of reading ability or accomplishment. They really measure achievement rather then capacity.

The question arises whether a reading disability causes the apparent retardation shown by such measures, or whether mental retardation causes the difficulty in reading comprehension.

It is a fact that a child may not be able to read, and still have normal intelligence. Even when we study the assumed to be closely related abilities of reading and intelligence among normal children, wide differences are found. Among the special class groups, the variances are even wider. Some of these children classified in such a group, are mentally defective yet can read readily but with little comprehension; still others cannot read though they have a high hearing comprehension. It is this last group that is penalized on intelligence tests, even the Binet and more so, on group tests.

About them, Marian Monroe says: "In order to differentiate them from the general defectives in whom the entire pattern of intellectual traits is more or less uniformly retarded, they may be regarded as having a special defect. Such a defect, if persistent, usually prevents the child from making progress at school and ultimately blocks the possibility of his preparation for an economic position in keeping with

his other capacities." 1/

In previous research, 2/ a marked difference has been found in the accomplishment quotients when mental age and hearing capacity are used as standards of ability. It would seem that dull children work up to and beyond capacity if it is measured by mental age, but fall short of it, if it is measured by hearing comprehension.

If the above assumption is true, is then the intelligence test the most satisfactory of all single measures to be used in classifying children according to innate abilities and capacities? Is the Binet examination the most valid estimate of the ability of the dull child?

This study will present data in an attempt to discover the relationships in the following:

1. To discover and evaluate the relationship between various tests of capacity:

a. reading and non-reading tests of capacity.

b. group tests of intelligence and Stanford-Binet scores.

c. group tests of intelligence and hearing capacity scores.

d. group tests and reading achievement scores.

1/ Marian Monroe, Children Who Cannot Read, P.1/ Chicago, Illinois: University of Chicago Press, 1932.

2/ Harriet Dodge, A Comparison of Stanford-Binet Mental Ages with Hearing Comprehension Ability of Dull Children. Unpublished Master's thesis, Boston University School of Education, 1939.

2. To discover the relationship between Binet mental age and hearing capacity:

a. to determine the number of children who are reading below their Binet mental age.

b. to determine the number of children who are reading below their Hearing Capacity.

c. to discover the relationship between mental age and reading achievement.

d. to discover the relationship between hearing capacity and reading achievement.

3. To discover the differences in achievement, when accomplishment is rated first by mental age and second, by hearing capacity.

SUMMARY OF PREVIOUS RESEARCH

CHAPTER II

SUMMARY OF PREVIOUS RESEARCH

A. Linguistic Factors Influencing Intelligence Testing

It would seem from the construction of common intelligence tests, that the authors assume the following factors to be the same among all children:

environment

experience

education

inspiration

stimulation.

Yet we know that this is not true, and that intelligence tests to be accurate measures of native endowment, should be independent of environmental factors. In the usual group intelligence test, most items demand reading ability. Such tests are validated by the following assumptions:

1. Reading achievement has a high relationship with the child's innate capacity and mental ability
2. Environment, experience, education, inspiration, stimulation and opportunity to learn to read and write, are equal for all children.

By strict adherence to definition, the test of native

intelligence should eliminate cultural factors, school factors, and special training elements. But most of the attention of psychologists has been paid to developing verbal tests; non-verbal and performance tests have been neglected.

There is no agreement among workers in psychological measurement on the question of language emphasis in intelligence tests.

"Is a test valid when to pass it depends on ability to frame an adequated language response as well as the comprehension of language?" 1/

We forget that not all children can make the same rate of progress; too, that they cannot make the same degree of progress.

We take for granted, when we use standard intelligence tests, that each individual has equal desire and opportunity to learn to read. The individuals who accomplish the least on intelligence tests are those for whom the desire is lowest and opportunities, least.

We can then presume that those penalized on language-demanding intelligence tests are not based (tested) on intelligence but upon motivation and opportunity limitations.

1/ Chester A. Gregory, Fundamentals in Educational Measurement, with the Elements of Statistical Method. New York: D. Appleton Company, 1922.

"There appears no study which shows that original endowment alone determines I.Q. or ability to learn to the extent to which one is endowed."[1/]

Witty also suggests that we attempt to ascertain those subtle factors which alter mental ages and control them. He feels that common intelligence tests measure acquired knowledge and skills, and abilities which are distinct from intelligence.

Colvin feels of these tests that they "measure an individual's intelligence largely in terms of what he has learned, thus obtaining indirectly a measure of his learning ability.... If the individual has the requisite skill and knowledge he can satisfactorily perform these tests. They are appropriate tests for intelligence only on the theory that they test ability to learn by discovering what has already been learned."[2/]

Group tests do not measure innate or native capacities. They measure:

1. general information
2. knowledge gained from school and pre-school experience
3. knowledge gained from environment
4. knowledge gained from reading

All the above classification could have possibly been grouped under the heading of "environment". Again there have been

---

1/ Paul A. Witty, "Intelligence of the Classes," P. 601. Progressive Education, XIII: December, 1936.
2/ S. S. Colvin, "Intelligence and Its Measurement: A Symposium", P. 136 Journal of Educational Psychology, XII: March 1921.

many opinions on environmental influences.

It is hard to measure the factor of these influences exactly, when we have no exact idea of precisely what we are trying to measure. It is these variables and influences together with our lack of control over them, which subject the field of mental measurement to criticism.

Isserlis found a distinct correlation between environment and intelligence of school children.[1/]

In her studies, Wellman shows:

1. Rich pre-school experience tends to raise the I.Q.
2. These intelligence test gains continue in school situations.
3. Children showing the greatest gains are those having the lowest original I.Q.'s.[2/]

The studies made by Gordon of underprivileged Gypsy and canal-boat children showed that children from four to six years old, approach closely the typical mean; those nine years old, with no formal education, obtained below average intelligence quotients. "At first it seemed reasonable to infer that the retardation in scholastic attainments was chiefly due to in-

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1/ L. Isserlis, "The Relation Between Home Conditions and the Intelligence of School Children", P. 18. Great Britain Medical Research Council, Special Report. Series No. 74.

2/ H. Skeels, R. Updegraff, B. Wellman, H. Williams, "A Study of Environmental Stimulation", University of Iowa Studies, Vol. XV, No. 4, December 1938.

ferior native ability. On further investigation however, it became clear that this lack of 'intelligence', as measured by the 'mental' tests used, could not be due to heredity or environment, but that it was probably due to their lack of schooling--a result in direct opposition to the opinion held by many authorities."[1/]

From this research, it is assumed that intelligence tests do not separate native ability and scholastic learning except among very young children. This brings up the question as to whether there is mental growth except in learning situations such as the school room. This in turn depends upon the child's surroundings and opportunities. It would be interesting to know the results of testing such children first on language comprehension tests and then on performance scales.

Henmon decries the need for a "scale for intellect, not a scale for intelligence tests.....The so-called general intelligence tests are not general intelligence tests at all but tests of the special intelligence upon which the school puts a premium."[2/]

Further, Pintner says, "The best known group tests at the present time depend largely if not entirely upon the knowledge and the use of language."[3/*]

1/ "Mental and Scholastic Tests Among Retarded Children", Great Britain Board of Education Educational Pamphlets, No. 44. 1923.

2/ V.A.C.Henmon, "Intelligence and Its Measurement; A Symposium", P. 137. Journal of Educational Psychology, XII. March 1921.

3/* Footnotes P. 10

There are those who warn of overdependence upon non-language and performance tests....."To escape from such a test (Binet), into performance tests is to go from the frying pan into the fire: for in avoiding knowledge and verbal skills we lose intelligence itself; many performance tests being largely a measure of manual dexterity."[1/]

Even the Stanford-Binet is overly influenced by verbalism. Scores may be raised by the child who is glib in his use of words; while children with poor linguistic ability have been affected ten points adversely by reading difficulty. The revision Forms L and M, were made to lessen the demands on language elements.

This complicates the problems in research in reading. "We have no physiological measures of intelligence. Our present tests of intelligence for children fo school age are largely measures of language comprehension. Items on many intelligence tests are almost identical to those on reading tests.... If we are to equate groups for reading experiements on the basis of mental ability we should have measures of mental ability which do not involve such large amounts of reading.....

3/* Rudolf Pintner, and Donald Paterson, A Scale of Performance Tests, New York: D. Appleton and Company, 1917.

1/ John Cox, Manual Dexterity, its Organization and Development, Cambridge, England: The University Press, 1934.

Research in reading would be aided greatly by instruments for measuring intelligence independent of reading."[1]

Pinter says: "Intelligence is shown in dealing with things as well as words.....We therefore, need intelligence test of all types. And by intelligence tests I mean tests of the general ability to do all sorts of things as opposed to educational and trade tests which are specifically made to measure the knowledge which an individual has been directly taught."[2]

Even in the problem of reading readiness, mental age as derived from Stanford-Binet is not a certain standard for success in reading, though its use is justified through lack of other measures, by Deputy[3] and Monroe.[4] Monroe finds that mental age correlates with reading more highly than chronological age. She feels that may be "partly due to the fact that, since reading has been considered as one of the measures of intelligence, the Stanford-Binet intelligence examination includes reading tests among its series of tests. A child with a special reading defect will necessarily be penalized on some of the tests."[4]

1/ Donald D. Durrell, "Research Problems in Reading in the Elementary School" P. 101; The Elementary English Review, Vol. 13, March-May 1936.

2/ Rudolf Pintner and Donald Paterson, A Scale of Performance Tests, New York; D. Appleton and Company, 1917.

3/ E. C. Deputy, Predicting First Grade Reading Achievement, Contributions to Education, No. 426. Teachers College, Columbia University, 1930.

4/ Marian Monroe, Children Who Cannot Read. P. 7. Chicago, Illinois: University of Chicago Press, 1932.

There is a great need for a non-linguistic intelligence measure which is completely free from environmental influences.

Trabue[1] states that the proportion of reading and language tests in so-called mental tests, range from 50% to fully 100%. He suggests changing the name of most established intelligence tests to "academic ability tests".

True these tests screen out poor readers, often libeling or labeling them, dull, stupid and so on.

From the results of Army Alpha and Beta tests, Trabue feels that our native illiterate group will not be brought below 16%... "that means one-sixth of our population will never be able to use written and printed English as an effective tool in civic and social life."[2] From the size of this group, and the wide use of verbalism in our "intelligence" tests, we see how the child deficient in reading ability is penalized.

Whether we change the name or not, these examinations test mainly the academic phases of intelligence.

Opinions about tests of intelligence which require reading a re divided.

Gates....."Tests which require reading are not satisfactory with children who have reading defects."[3]

1/ Marion R. Trubue, Measuring Results in Education, New York: American Book Company, 1924.
2/ Marion Trubue, Measuring Results in Education, New York: American Book Company, 1924.
3/ Arthur Gates, The Improvement of Reading, New York: Macmillan Company, 1935.

An English authority, Burt, made a study of the amount of connection between educational achievement and intelligence quotient of London public school children. He says: "Education and particularly linguistic attainments affect the result of the Binet-Simon scale more profoundly than almost any other factor."[1/]

As examples of the stress on verbalism, the vocabulary items on the Binet examinations the questions of general information demanded in certain group tests, such as the Otis, Terman, etc., and the items on all tests requiring sentence completions, following directions, and use of vocabulary.

B. Verbal Aspects of Stanford-Binet Examination.

Speaking of the demands of the Stanford-Binet vocabulary test, Kent says "In the first place, 100 words (or 50 words) selected by rule from a dictionary of 18,000 words do not afford a large enough sampling to justify a conjectural estimate of any use in determining the subject's 'mental age'. Whether we accept the total-vocabulary estimate or not, we base the ten-year child's rating upon his thirty acceptable responses, not upon the 5400-word vocabulary which he is supposed to possess."[2/]

She continues, "It is impossible that the Stanford-Binet

1/ Cyril Burt, Mental and Scholastic Tests, London: P. S. King & Son, Ltd., 1921.
2/ Grace Kent, "Suggestions for the Next Revision of the Binet-Simon Scale", The Psychological Record, I. November, 1937.

scale or any other inflexible system should be suitable for cases of unusual types.....When a child of reading age is referred to the clinic because of his failure to learn to read, it is of the first importance to ascertain whether his mental capacity is or is not within normal limits. A composite test which contains reading matter for the subject discriminates against the subject whose inability to read is due to any cause other than mental retardation.....What we measure by the test may be significant, but it is something quite other than what the test is intended to measure."[1/]

Burt says concerning the Binet test, "But to achieve distinction, at all events in a trial so academic as the Binet-Simon tests, experience must be heavily supplemented; it must be reinforced either by the artificial aids supplied by a civilized society or by the natural stimulus of an unusual native wit."[2/]

He believes that three factors--age, intelligence, and school attainments--together, determine a child's achievements in the Binet-Simon tests in the following proportions, "one-ninth is attributable to age, one-third to intellectual development, and over one-half to school attainments."[2/]

1/ Grace Kent, "Suggestions for the Next Revision of the Binet-Simon Scale", The Psychological Record, I. November, 1937.
2/ Cyril Burt, "Mental and Scholastic Tests Among Retarded Children," Great Britain Board of Education, Educational Pamphlets, No. 44. (1923)

Cattell summarizes objections to the Binet test:

"1. The component items are frequently tests of scholastic attainment and life experience, rather than 'G'.

2. Test items are too few in number (over any limited age range) for consistency or validity.

3. The nigher mental ages are not catered for.

4. Certain special group factors play a large part, notably 'V' or the verbal factor.

5. If, as most clinical psychologists concede, the test is not concerned with any one ability, the use of a single quantitative value for the hodgepodge is meaningless.

6. Binet does not give a standard deviation of intelligence quotients as wide as that which actually exists.

7. Personal situation produces possible embarrassment in the subject; subjectivity of scoring by the examiner."[1/]

Binet is concerned with the measurement of verbal capacity particularly above the seven year level. This is shown in the preponderence of tests of vocabulary and word meaning, language relationships and comprehension.

1/ Raymond B. Cattell, "A Culture Free Intelligence Test I", P. 161. Journal of Educational Psychology, XXXI. March1940.

To escape the penalties of such test items, performance tests are used to balance the stress of the test, for the following persons in particular:

1. preschool children
2. illiterates
3. foreign born persons, having non-adequate command of English
4. hard of hearing individuals
5. deaf
6. speech-defectives
7. those who have special ability with language . (verbalists)

There are those who defend the test of mental ability based on linguistic factors. These people feel that use of verbal symbols is one of the prime elements of intelligence. But the intellectual capacity of the following is not found in verbal tests:

1. school children retarded in grade placement.
2. school children retarded in reading achievement.
3. adults who have limited educational opportunities.
4. adults who tend to be non-verbalists.
5. adults who are totally illiterate.

These are the group whose language function is not developed to the optimum of their native endowment.

√ Terman says that "many criticisms of the current methods of testing intelligence rest plainly on a psychology which fails

to distinguish the levels of intellectual functioning or to assign to conceptual thinking the place that belongs to it in the hierarchy of intelligences.....If intelligence is the ability to think in terms of abstract ideas, we should expect the most successful intelligence tests to be just those which involve the use of language or other symbols."[1/]

Cattell's opinion in the controversy is that "Most of the current statements about I.Q.'s are really statements about special environment skills, functional fluctuation, experamental error, etc. in unassigned degrees, as may be represented by the following equation:

I.Q. (apparent) = I.Q. (real) ± s ± f ± e ± p

where "s" is a large special factor of knowledge or skill

"f" is the functional fluctuation of the individual's intelligence

"e" is the experamental error of measurement

"p" is a factor of intelligence test sophistication."[2/]

1/ Lewis M. Terman, "Intelligence and Its Measurements: A Symposium," Journal of Educational Psychology P. 129. XII. March, 1921.

2/ Raymond B. Cattell, "A Culture Free Intelligence Test I". P. 179. Journal of Educational Psychology, XXXI. March 1940.

C. Language Skills of Normal Children

In his study of the hearing comprehension of normal children, Young was interested in finding "to what extent is reading a bility the result of a good language comprehension?"
He raised the following questions:

"What abilities are needed in reading over and above those utilized in the comprehension of language?

Are reading failures due to low language comprehension, or are they due to deficiencies to translate the symbols on the printed page?" 1/

These are his findings:

"Children in intermediate grades tend to comprehend through reading quite as fast, if not faster than, they improve in their ability to comprehend through hearing. In general, children who do poorly in comprehending through reading do poorly in comprehending through hearing." 1/

He agrees that much of so-called reading disability is poor language comprehension.

"The relationship between reading comprehension and retention on the one hand, and hearing comprehension and retention on the other, is a very detailed and intimate one." 1/

1/ William F. Young, "Relation of Reading Comprehension and Retention, to Hearing Comprehension and Retention", 5:30-39, Journal of Experimental Education, September, 1936.

There is the question of the so-called false low I.Q. Can the I.Q. be artificially lowered by the lack of reading ability?

"The relationship between intelligence and reading ability is positive although low intelligence is infrequently a cause of poor reading. This paradox requires explanation. Intelligence in behaviour is reflected in the perception, assimilation, and organization of meanings. Reading, a discriptive and understanding reaction to word symbols, is but one of the many specialized, abstract experiences and activities in life which necessitate for their comprehension and performance the functions or processes attributed above to intelligence-inoperation. ...Reading is thus merely one individuation of intelligent behavior.....We must distinguish between intelligence-in-operation and intelligence-test results."[1/]

Reading-test and intelligence-test scores actually correlate about ± .6. Both are weighted heavily by vocabulary scores, which makes verbalism a common factor. Thus, a mental test may be a good measure of probable academic success--but is it an accurate measure of intelligence?

Price finds that verbal and non-verbal tests correlate quite differently with tests of reading ability. He found a correlation of ± .5 and ± .7 between verbal intelligence tests

1/ Paul Witty and David Kopel, Reading and the Educative Process, P. 225-226. Boston: Ginn and Company, 1939.

and reading tests, while the correlation between non-verbal intelligence tests and reading comprehension was lower. The correlation coefficients varied with the tests used and the groups tested.[1]

Hawthorne, in a study of 104 pupils as much as three years retarded in reading, given reading tests and group intelligence tests, before and after a semister's remedial reading instruction, showed:

1. No corresponding improvement in intelligence.
2. There was a low correlation between initial retardation and the I.Q.
3. The relationship between degree of initial retardation and degree of improvement of reading was insignificant.[2]

D. Language Skills of Dull Children.

It has been found that "children with special reading disabilities tend to score higher on performance tests than on vocabulary test, if they are mentally stable."[3]*

Uhler found on a group of school children referred to the Delaware Mental Hygiene Clinic who scored higher on performance

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1/ Rufus E. Price, The Relation of Ability in Silent Reading to Intelligence, Unpublished Master's thesis, University of Texas, Austin, 1929.

2/ J. W. Hawthorne, "The Effect of Improvement in Reading Ability on Intelligence Test Scores", P. 41-51, Journal of Educational Psychology, XXVI, 1935.

3/* Footnotes P. 22

tests than Binet, that "thirty out of fifty diagnosed Special Reading Disability.....eleven seriously retarded in language functioning on school achievement tests, and Wallin Attainment Scale.....if the Binet test had been used alone.....as a routine proceedure, 48% of average intelligence children would have been passed as feebleminded".....He concluded, "A large percentage of the group studied are retarded in their language development far below the level of their native intelligence."[1/]

Foss finds that the Binet mental age and understanding of spoken language differ greatly for the same individual.

Dodge[3/] found that on one group of dull children, the critical ratio between reading achievement and hearing capacity was 12.69, while on a second group, the critical ratio was 2.86. The critical ratios between reading achievement and mental age (as computed on Binet) for the two groups were, 1.16 and 1.59 respectively.

She found that the difference between mental age and hearing capacity was statistically significant, with critical ratios

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3/* J. Jastak, "Variability of Psychometric Performances in Mental Diagnosis", Delaware Medical Journal-VI: 1934.

1/ C. Uhler, "Wide Span Psychometric Patterns", P. 67. Delaware State Medical Journal, IX: 1937.

2/ Gertrude Foss, The Effect of Reading Comprehension on Reading Achievement of Mentally Retarded Children, Unpublished Master's thesis, Boston University, School of Education, 1938.

3/ Harriet Dodge, A Comparison of Stanford-Binet Mental Ages with Hearing Comprehension Ability of Dull Children, unpublished Master's thesis, Boston University School of Education, 1939.

for the two groups of 14.73 and 21.95.

In a study of the language abilities of dull children, Foss[1] found that if the criterion of reading disability was a reading age one year or more below Stanford-Binet mental age, 14.5% were retarded. When reading age was compared to hearing comprehension age, however, 74.5% were retarded.

Gordon worked on the relationship between the mental and educational ratio of dull children. He obtained a correlation coefficient of ƒ .668.[2]

When speaking of the dull-normal population in comparison with the feeble-minded group, Heck tells of the proceedure used in the state of Missouri, which attempts to "differentiate between the feeble-minded and the inferior normal. The former are however mentally deficient whereas the latter are only verbally deficient. On performance or non-linguistic tests, the latter may be normal or even exceed normal; they have insight and understanding, which the feeble-minded do not have."[3]

Both the above groups have the same mental ages at maturity, ranging from eight to ten years.

1/ Gertrude Foss, Language Comprehension Skills of Mentally Retarded Children, Unpublished Master's thesis, Boston University School of Education, 1938.
2/ William and Dorothy Thomas, The Child in America. P. 358. New York: Alfred Knopf, 1932.
3/ Arch Heck, The Education of Exceptional Children, P. 361. New York: McGraw Hill Book Company, Inc., 1940.

E. Language and Non-Language Tests of Intelligence

One of the newer intelligence tests, the California Test of Mental Maturity,[1] is called a "diagnostic" test. It may be used as a guide for teaching proceedures; does the child learn best through language or non-language activities? Does lack of opportunity, not lack of native capacity account for his performance? This can be discovered when there is a significant difference between language I.Q. and non-language I.Q.

This test has a pre-test for screening out children who have gross visual, auditory or motor-coordination difficulties.

Typical of the use of this test, is Richardson's research on success in reading related to two types of general ability, testing 58 fourth grade children to classify them as belonging to balanced, non-language or language types.[2]

Traxler made a study of the Advanced Battery of the California Test of Maturity and found its reliability, high.

Reliability of Test:	Traxler Study	Manual
Total Factors	917	949
Language factors	911	913
Non-language factors	860	931

1/ California Test of Mental Maturity, Tiegs, Lee and Clark, Southern California School Book Depository, Ltd. Los Angeles.

2/ Helen Richardson, The Relation of Success in Reading to Two Types of General Ability, Unpublished Master's thesis, University of Chicago, 1933.

Median of Language I.Q.'s and Median of Non-Language I.Q.'s for Groups Representing Varying Levels of Reading Ability

	No. of cases	Median	Difference
Highest Quarter			
Language I.Q.	19	147.0	32.0
Non-Language I.Q.	19	115.0	
Upper Middle Quarter			
Language I.Q.	19	144.6	
Non-Language I.Q.	19	114.5	30.1
Lower Middle Quarter			
Language I.Q.	18	116.0	12.0
Non-Language I.Q.	18	104.0	
Lowest Quarter			
Language I.Q.	18	103.3	4.3
Non-Language I.Q.	18	99.0	

Traxler shows that the relative size of language and non-language I.Q.'s varies with reading ability. The language I.Q.'s of the superior readers are, on the average, much higher than their non-language I.Q.'s, while the difference is quite small for the pupils in the lowest quarter of the group in reading skill. This lowest group is still in language factors. Traxler believes that this is due to the fact the group tested, were from a private boy's school, and that even the poorest readers were superior to the public school norm. 1/

1/ Arthur Traxler, "A Study of the California Test of Mental Maturity, Advanced Battery", Journal of Educational Research, Volume 32, number 5, January 1939.

F. Effect of Reading Achievement on Intelligence Test Scores

The Durrell-Sullivan Reading Capacity Test[1] is based on the premise that if a child comprehends auditory symbols, he should be able to understand visual symbols up to the same degree of difficulty.

On intelligence tests that require reading, it is impossible for the child deficient in reading ability to score high even though he may have normal or superior intelligence.

With the Reading Capacity and Achievement Tests,[2] the degree of retardation can be measured by comparing reading achievement with the child's capacity to understand spoken language. Low reading achievement is often explained by low mental age derived from intelligence tests that require reading or language organization. These tests, obtaining a result of dull, keep us from discovering children who need special help in reading.

In his study of the effects of reading ability on intelligence measures, Durrell found that 28.7% of 1,130 children were reading a year or more above their Stanford-Binet mental age; 15.2% were reading a year or more below, while 56.1% were reading within a year of their mental age. He found that reading a bility and mental ability do not show equal growth for a

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1/ Reading Capacity Test, Durrell-Sullivan, World Book Company.
2/ Reading Achievement Test, Durrell-Sullivan, World Book Company.

large number of children; nor does the fact that they have spent equal time in school show that they fain in school subjects in exact proportion to their mental ability. Durrell found further that those children with higher reading ability rated higher on group intelligence tests than on Binet, while those with lower reading ability rated lower on group reading tests than on Stanford-Binet.

Children with superior reading accomplishment were found to have lower I.Q.'s; children with low I.Q.'s achieve more than is expected for their mental ages.[1/]

The large factor of language demands in measurement cause many children who are really normal or bright to be classed as dull because of lack of reading ability.

1/ Donald D. Durrell, "The Influence of Reading Ability on Intelligence Measures", XXIV, P. 412-416. September, 1933. Journal of Educational Psychology.

DESCRIPTION OF INVESTIGATION

CHAPTER III

DESCRIPTION OF INVESTIGATION

A. Tests Used

The following tests were used in the study of mental test variations among dull children:

1. Stanford-Revision of the Binet-Simon Tests. [1]
2. Durrell-Sullivan Reading Capacity Test. [2]
3. Durrell-Sullivan Reading Achievement Test. [3]
4. California Test of Mental Maturity, Primary Battery. [4]
5. Pintner-Durost General Ability Tests, Elementary Battery, Form A. [5]

1/ Lewis M. Terman and Maud A. Merrill, Measuring Intelligence, Boston: Houghton Mifflin Company, 1937.

2/ Durrell-Sullivan Reading Capacity Intermediate Test, for grades 3 to 6, Form A. Directions for Administering and Scoring, New York: World Book Company, 1937.

3/ Durrell-Sullivan Reading Achievement Intermediate Test, for grades 3 to 6, Form A. Directions for Administering and Scoring, New York: World Book Company, 1937.

4/ E.T.Sullivan, W.W.Clark, and E.W.Teigs, California Test of Mental Maturity, Primary Battery, Grades 1 to 3, Manual of Directions, Los Angeles: California Test Bureau, 1936.

5/ Rudolph Pintner and Walter Durost, Pintner General Ability Tests, Verbal Series, Pintner-Durost Elementary Test, for grades 2½ to 4, Experimental Edition, Directions for Administering, New York: World Book Company, 1940.

B. Description of the Tests

The Stanford Revision of the Binet Simon Test was the individual intelligence examination geven to the children included in the study. The mental ages were derived from these tests in a manner described later in this chapter. Though the Binet examination is largely verbal in character, it is the most generally accepted and universally used of all intelligence tests. It is the standard method of clinical evaluation of mental capacity, due to its relative adaptibility to all types of subjects.

The children were tested by either form L or M, which are equivalent "with respect to difficulty, range, reliability and validity."[1/] The revision closely parallels the old Stanford revision of 1916 and the older original Binet, but has been widened and enlarged upon to include 129 tests. The revision was made to increase the number of non-verbal tests particularly on the lower levels, and to lessen the language demands of the test.

Dodge found that in the tests on the levels from six to fourteen years, of 54 items, 34 required oral responses. Still others required oral repetition. She found that only 12 tests were completely non-verbal.[2/]

1/ L.M.Terman and M.A.Merrill, Measuring Intelligence, Boston: Houghton Mifflin Company, 1937.

2/ Harriet Dodge, A Comparison of Stanford-Binet Mental Ages with Hearing Comprehension of Dull Children, unpublished Master's thesis, Boston University School of Education, 1939.

Because of the wide use of this test, it seems unnecessary to go into a more detailed description of the examination. Details of administration, statistical analysis, basis for validity and reliability are all included in the manual for use with the Stanford-Binet examination, "Measuring Intelligence", by Lewis M. Terman and Maud A. Merrill, Houghton Mifflin Company, Boston, 1937.

The Durrell-Sullivan Reading Capacity Test is based on the assumption that "serious reading disabilities can be discovered by revealing discrepancies between the child's understanding of spoken language and his understanding of the printed word," which can be measured when this test is used in connection with the Durrell-Sullivan Reading Achievement Test. The Reading Capacity Test is a group test designed to give an estimate of the child's capacity to read in relation to his capacity and understanding of spoken language. It is based on the assumption that a child can learn to read up to a degree equally high as his ability to understand spoken language. In the vocabulary test, the child indicates his response by marking the picture of the word pronounced by the examiner. In the paragraph test, he shows his understanding of orally presented paragraphs and questions by selecting the right picture from a group of multiple choice pictures. Though this is a test of "verbal" ability in that it demands language comprehension, it does not require verbal or linguistic expression.

Of course, the authors have made the assumption that the factors involved in the reading of printed symbols are very closely related or nearly identical with the factors involved in the understanding of spoken language.

The Durrell-Sullivan Reading Achievement Test is a group test designed to show the individual's reading achievement. The first portion is one of vocabulary meaning of the multiple choice type. The second or paragraph meaning section of the test also utilizes the multiple choice type of response. Unlike the Capacity Test, the child is timed and allowed to proceed at his own pace. The picture response is utilized on the Capacity Test, while printed word responses are used in the Reading Achievement Test. Both tests are designed for use in grades three to six and both tests consist of two parts.

The reliability coefficients for individual grades in the Reading Capacity Test are from .89 to .94. For all grades combined, the coefficient is .95.

The reliability coefficients for individual grades in the Reading Achievement Test are from .94 to .96. For all grades combined, the coefficient is .98.

The time for administering the Capacity Test ranges from 30 to 45 minutes; for the Achievement Test, about 30 minutes.

The tests were standardized on the same population, and are closely parallel in difficulty, content and style.

The California Test of Mental Maturity, Primary Battery was a group test of mental ability included in the study. It is aimed at testing the ability to accomplish in the school situation, in terms of native mental factors. It is constructed to have certain diagnostic features....."to make for each pupil a diagnostic evaluation of his various mental abilities."

From the total test, a mental age and IQ may be obtained, that is comparable with the usual general intelligence test. In addition, separate mental ages and IQ's may be obtained from the language and non-language portions of the test.

Each battery of this examination (of which there are four) is built on a comparable pattern including fifteen to sixteen different subtests, of which part are classified as language tests, and part as non-language tests. The authors state, "The analytical comparison of the various sections of the test indicates a definite central factor, but yet a specificity for each test to justify its inclusion as a measure of a more or less unique factor."

The test is given in two sections of 45 to 50 minutes each to avoid the penalty of fatigue, which would otherwise be involved in a test of such length.

It includes three pre-tests, a feature not found in any other test; one, of visual acuity, the second, of auditory acuity; the third, motor control. This section of the test is designed to screen out children with gross handicaps who would otherwise be handicapped on the actual test itself.

The California Test of Mental Maturity tests are constructed to measure the following functions:

1. Memory, (immediate and delayed recall)
2. Special relationships, (sensing right and left, manipulation of areas, foresight in spatial situations)
3. Reasoning, (opposites, similarities, analogies, number series, numrical quantity, inference)
4. Vocabulary

All the tests in this battery are of the picture variety. The test yields three mental ages. The first is obtained from the total score. The second mental age is obtained from the tests involving language factors, of which there are four:

1. Delayed recall, (questions on facts from a previously read story)
2. Number quantity, (arithmetical problems)
3. Inference, (deductive reasoning)
4. Vocabulary, (multiple choice pictured response)

The third mental age is derived from the remaining tests which should be considered non-verbal rather than non-language tests, since they do require understanding of spoken language upon the part of the child. The directions for all the tests whether language or non-language are given orally.

The non-language tests included the following:

1. Immediate recall, (direct memory test)
2. Sensing right and left

3. Manipulation of areas, (recognizing similar shapes)
4. Foresight in spatial relations, (maze tracing)
5. Opposites, (pictured multiple choice)
6. Similarities
7. Analogies
8. Number series
9. Number quantity

Most of the reliability coefficients for total mental factors for all grades and batteries are about .95. For the language tests, they are above .90 and the non-language coefficients are lower, falling between .70 and .90. They have been found to correlate closely with other tests of intelligence.

The second group test used in the study was the Pintner-Durost Elementary Test of General Ability, Verbal Series, Form A. The complete series included in the battery measure several different phases of general intellectual ability. The Elementary Test is composed of two separate scales, which can be used alone, or together to give a composite mental age. Scale I is non-reading in character, administered with oral directions and pictured responses. The child is not required to read on this test.

Scale II is a reading test of general ability, with a multiple choice type response which the child reads himself. The reading test is timed strictly, while the non-reading section proceeds at the rate of the examiner.

The scales closely parallel each other in content and difficulty. They comprise six subtests of unique mental abilities:

1. Vocabulary
2. Number Sequence
3. Analogies
4. Opposites
5. Logical Selection
6. Arithmetic Reasoning

From the total test, two mental ages may be obtained, one utilizing reading skills and one independent of them. Thus a comparison of the two wil show linguistic tendencies, either as abilities or disabilities.

The norms for the Elementary Test were obtained from 22,000 cases. Split-half reliability coefficients were obtained on both scales; .92 for Scale I (non-reading) and .97 for Scale II (reading). The raw scores are converted into standard scores from which a Median standard score is computed for each scale; from these scores mental ages for each section as well as a total mental age is derived.

The test is given in two periods of 45 minutes for each section.

The opportunity to use the experimental edition of this test for the study was provided through the kindness of Dr. Walter Durost of the World Book Company.

C. Children Included in the Study

This study is based on data gained from 189 special class children whose chronological ages ranged from seven years-ten months to eighteen years-one month. The average age of the group was thirteen years-three months.

Figure I shows the distribution of chronological ages.

The mental capacity of the group is indicated by the following table showing the range of IQ's derived from the individual Stanford-Binets given during the last three years. The IQ's of the group range from 47 to 95, with an average IQ of 71.2. Table I shows the distribution of individual Stanford-Binet IQ's for the group on combined data.

Table I

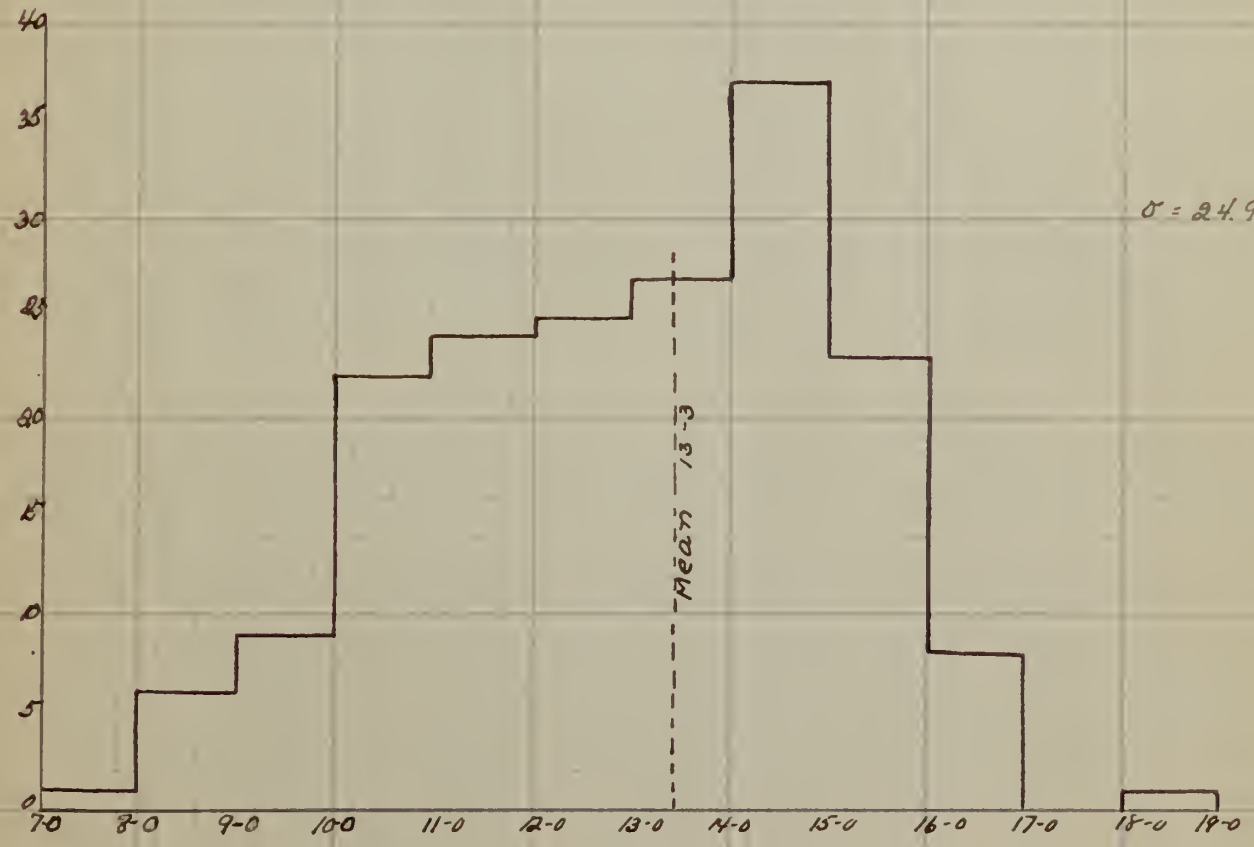
Distribution of Stanford-Binet IQ's
of 189 Special Class Pupils

I.Q.--	40-49	50-59	60-69	70-79	80-89	90-99
Number--	2	20	58	79	27	3

The distribution is rather narrow as would be expected from such a selected group; most of the IQ's fall between 65 and 80.

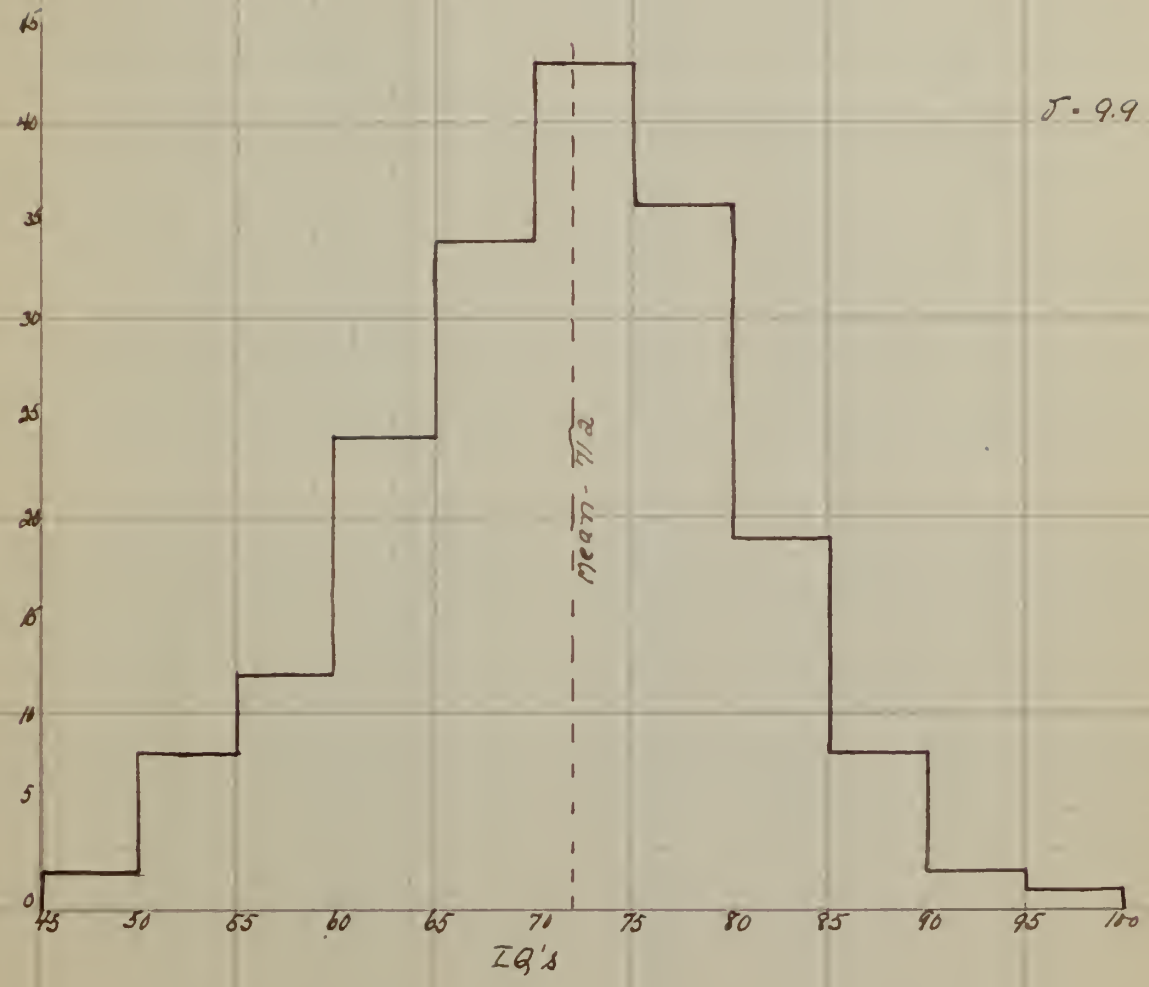
Figures II and III show the distribution of IQ's and Binet mental age scores.

Figure I



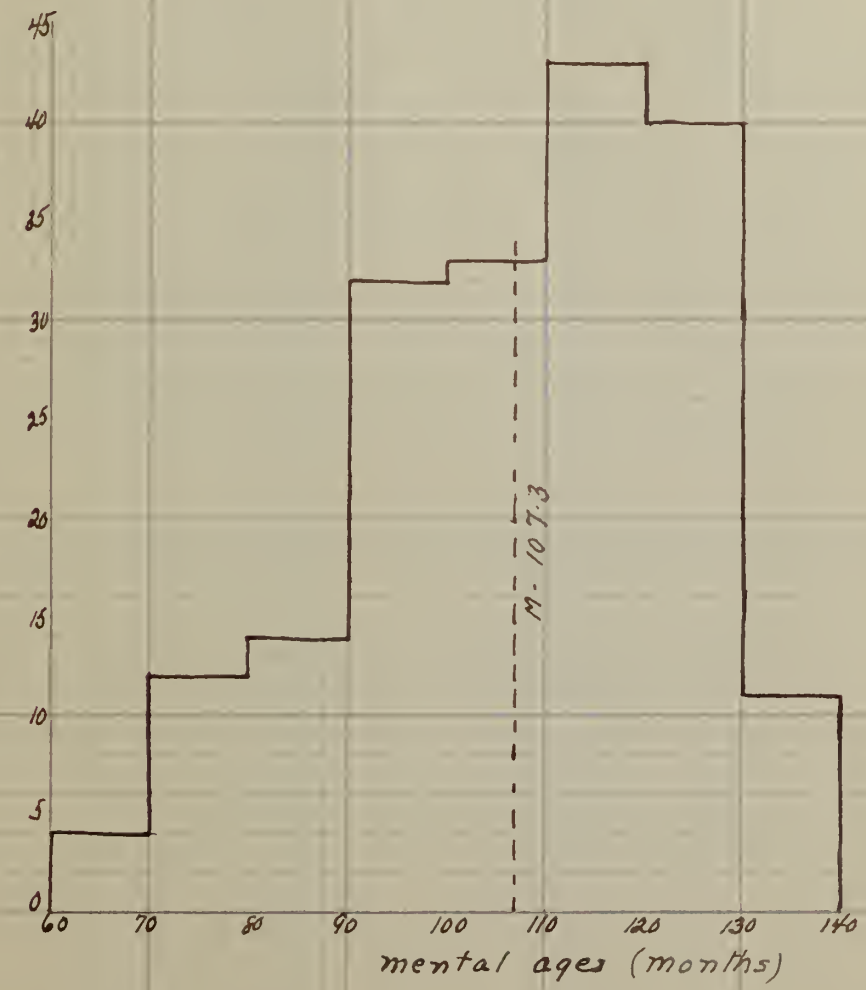
Distribution of Chronological Ages of 189 Special Class Pupils

Figure II



Distribution of Stanford-Binet IQ's of 189 Special Class Children.

Figure III



Distribution of Stanford-Binet Mental Ages

Table II summarizes preliminary information on the children tested, and the results of Binet examination.

Table II

Summary of Preliminary Information

City		No. of Cases	Mean Mental Age	Mean Chrono-logical Age	Mean I.Q.
Salem	Boys	50	111.5 mos.	163.4 mos.	68
"	Girls	21	101.5	154.5	67
"	Total	71	108.0	160.7	65.5
Lynn	Boys	84	107.3	152.5	72.6
"	Girls	34	102.0	155.0	67.6
"	Total	118	105.7	153.2	70.9

This data was obtained through the kindness of the respective school departments of Lynn and Salem, who made the records on the children available. The children were, for the greater part from non-English speaking background.

D. Brief Description of the Data

This study is based on data obtained in two cities, Lynn and Salem, Massachusetts, during February and March 1941. In all, over three hundred children were tested by the author, but of these, only one hundred and eighty nine cases could be obtained on which the data was complete. This was due to absences, and to old Binets. All children to whom Binets had not been given after September 1938, were omitted from the final data. The derived mental ages were computed on the current chronological age and IQ, using a straight line prediction ignoring the IQ loss expected on mentally retarded children, making comparisons smaller on present calculations, than could be expected if the Binets were new.

Ten to thirty children were tested at one time on the group tests; the teachers were usually present in the room to assist in seeing that the right place was kept, or to replace broken pencils. They did not interfere in the administration of the tests.

The tests were given in six to eight testing periods, (subdividing the longer tests) that the children should not become fatigued. The directions for administering the tests were followed implicitly.

From the data obtained on the tests described at the beginning of this chapter, several investigations were based. Derived mental ages were checked as well as the scoring and tabulation of the test results.

For the purposes of comparison, ages obtained on the Durrell-Sullivan Hearing Capacity Test were treated as mental ages.

The scores on each section of all tests as well as the total scores, chronological ages and IQ's are included in Table I of the Appendix.

E. Treatment of Data

1. Scores obtained for the group of one hundred eighty nine cases were studied to determine the relationship betweeen tests of capacity. Frequency tables were set up on: chronological ages; IQ's; Binet mental ages; Hearing Capacity scores (total and partial) which were treated as mental ages; reading ages derived from the Durrell-Sullivan Reading Achievement test; total Pintner-Durost Test mental ages, non-reading scores, reading scores; total California Test of Mental Maturity mental ages, non-language scores, language scores.

Correlations between the tests and subtests were found by the Pierson Product Moment method of correlation. Means, standard error of the means, standard deviations, standard error of the differences, critical ratios were obtained for each of the above.

2. Scores were studied to discover the extent of reading difficulty among the group. A child was considered retarded in reading, if he was reading a full year or more below his

capacity as computed on either Binet or on the Durrell-Sullivan Hearing Capacity Test. The study of the relation between mental age and hearing capacity was made on a mean score basis and correlations. Table II in the Appendix shows the extent of reading disability for the individual cases included in the study.

3. From the above study, the group judged as retarded on Binet could be compared with the group judged as retarded on the Hearing Capacity Test; achievement quotients using Binet as criterion could be compared with achievement quotients using Hearing Capacity as a standard.

ANALYSIS OF DATA

IMPLICATIONS FOR FURTHER STUDY

CHAPTER IV

ANALYSIS OF DATA
IMPLICATIONS FOR FURTHER STUDY

Introduction:

The first study made was that of the relationship that existed between the various tests used.

Though from previous researches, many assumptions might have been made, it was realized that among the several intelligence tests administered to the same individual, differences in prediction could be made.

Too, owing to the specialized population, it was realized that it would be difficult to make generalizations.

In surveying the data, many questions must be left unanswered until further and more detailed research can be made. It is suggested that the data be analyzed with reference to the following questions which arose during the study.

The first variance which would influence the comparison of general intelligence tests is that of the basic assumptions on which the test was built, such as the author's concept of intelligence. If there is a divergence of opinion between the authors of several tests, as to the definition of intelligence and the number of abilities involved in this definition, cannot it but be expected that there will be differences in the functions which the tests measure?

Another decided variance would be in the test construction. There are wide dissentions as to the best method of presentation to use, the method of indicating the answer, length of attention span, (is it test of power and speed, or ability) the method of timing and limiting, whether the child should know he is being timed or not, the method of marking and coding, the amount of impetus given (That is to say, whether the child is allowed to proceed at his own speed, or whether the examiner is constantly giving him a push.), the method of test standardization, the size and type of population that should be used on the standardization, the method of testing reliability and validity of the test items and function. All these are variances which may possibly influence the relationship between two or more tests, on which it is assumed the same function is measured.

If a single intelligence test is given, the individual is assigned a certain mental age. If several are given, it is very possible that the individual will be assigned several mental ages. Which of these is the most reliable? Shall the examiner concede that if the child has attained a certain score on a test that he has the capacity to achieve up to that test, and that lower scores are invalid? Or shall an average or median score be taken as the best indication of the individual's ability?

When several varying estimates of an individual's native ability are found, on which one should we base this educational prognosis? With which one should we compare his scholastic achievement? If his achievement is normal in one comparison,

yet extremely low on another, which judgement of his apparent retardation or normalacy should be taken?

Can any one intelligence test be considered infallible? Cannot the individual's score be changed on the same test, if it is given by different examiners? The question of the amount of divergence and misuse the administration of the test allows is very important. Often test directions may be badly interpreted. Again can the examiner maintain a reasonable amount of uniformity and constancy of manner, without becoming mechanical?

Can any single test be an adequate instrument to rate mental deficiency? Is a battery of tests more reliable? Can any test be used so that its sensitivety is fine enough to distinguish the hair's breadth difference between adequate normal ability and deficiency in so-called "border line" cases?

Is there any single test or group of tests flexibel enough to fit all the demands of the school, clinic and hospital in mental testing?

When comparing several tests in a similar study, is there enough agreement between the tests that it can be said that certain of these are an absolute scale?

Can the surroundings, emotional attitudes of both examiner and examinees, and even the weather conditions not influence the test?

To return to the test construction, is the test strong enough to discriminate at both the upper and lower ends of the normal scale to cover the dull child and also be fair to the superior individual? Too, when using a test that includes

several batteries, cannot the scores of the individual be raised or lowered according to the grade level of the battery used? Without utilizing the multiple battery form of test, can the range of a single test be strong enough to adequately cover the variability of a single individual? Do these tests under considerations, provide for special talents and defects that the individual may possess?

If two or more tests agree for certain subjects, is that assurance of their reliability? If the ratings agree for one subject, will they agree for the next?

Will there always be the same degree of difference between two tests for every individual? If the ratings for a single subject range in order, Test I, Test II, and Test III, will they range in that order for the next subject?

There is a possibility of wide mental age range by judicious choice of the intelligence test; research has shown that IQ's may be artificially raised or lowered in such a procedure.

It would seem that the quandary of test results only shows further the great inadequacy of mental test measurements.

A. Results of Various Mental Tests

The scores on each of the mental tests, Stanford Revision of the Binet-Simon Test, Form L or M; the Durrell-Sullivan Reading Capacity Test; the Durrell-Sullivan Reading Achievement Test; the Pintner-Durost Elementary general Ability Test; the California Test of Mental Maturity, Primary Battery, for the one hundred and eighty nine cases in the combined Lynn and Salem data, were studied and the following means and standard deviations were arrived at for each of the tests. Table III shows these results expressed in months of mental ages.

TABLE III

Mean Scores for all Tests

Test	Mean Mental Age	Standard Deviation
Hearing Capacity	119.1	20.0
Binet	107.3	17.1
Reading Achievement	102.5	18.1
California Test	101.6	18.3
Pintner-Durost	97.4	16.3

The Durrell-Sullivan Capacity Test had the highest mean mental age, 119.1.

The other scores ranged in descending order..Binet individual examination, mean mental age, 107.3; Durrell-Sullivan Reading

Achievement Test, mean reading age, 102.5; California Test of Mental Maturity, mean mental age, 101.6; Pintner-Durost mean mental age, 97.4.

Figures IV to VIII show the actual score distributions in terms of months of mental age.

On the various subdivisions of the tests, the following mean mental ages were obtained, as shown on Table IV.

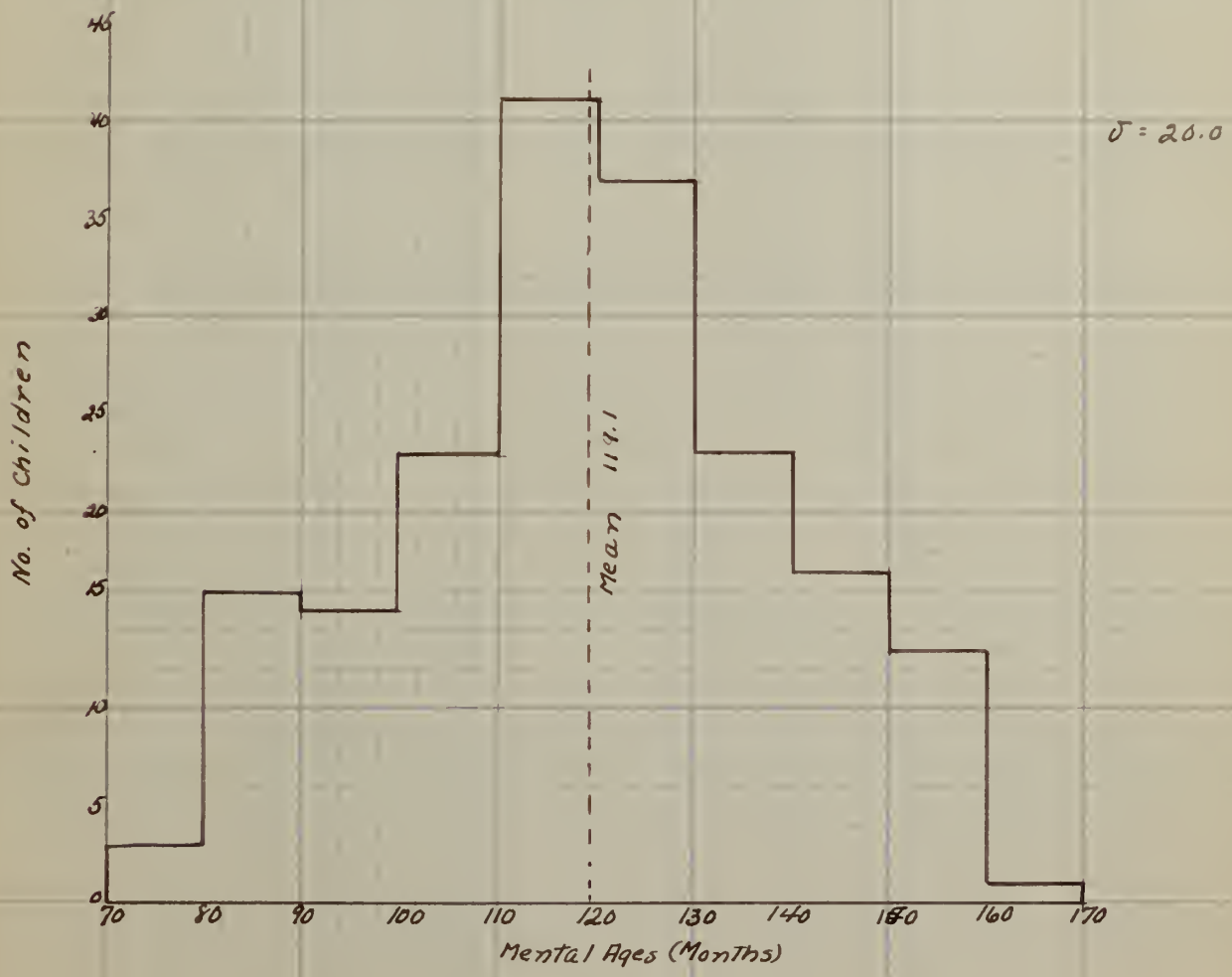
TABLE IV

Mean Mental Ages of Sub-Tests

Test Form	Mean Mental Age	Standard Deviation
Hearing Capacity paragraphs	117.57	18.0
Hearing Capacity vocabulary	117.36	21.6
Reading Achievement paragraphs	104.05	19.6
California Test language	102.3	19.9
Reading Achievement vocabulary	101.4	19.2
California Test non-language	100.9	18.9
Pintner-Durost non-reading	99.2	19.8
Pintner-Durost reading	96.1	17.0

Scores on the test sub-scores ranged from 117.57 for the mean mental age on the Hearing Capacity Paragraphs to 96.1, mean mental age on the Pintner-Durost Reading Test. The mean

Figure IV



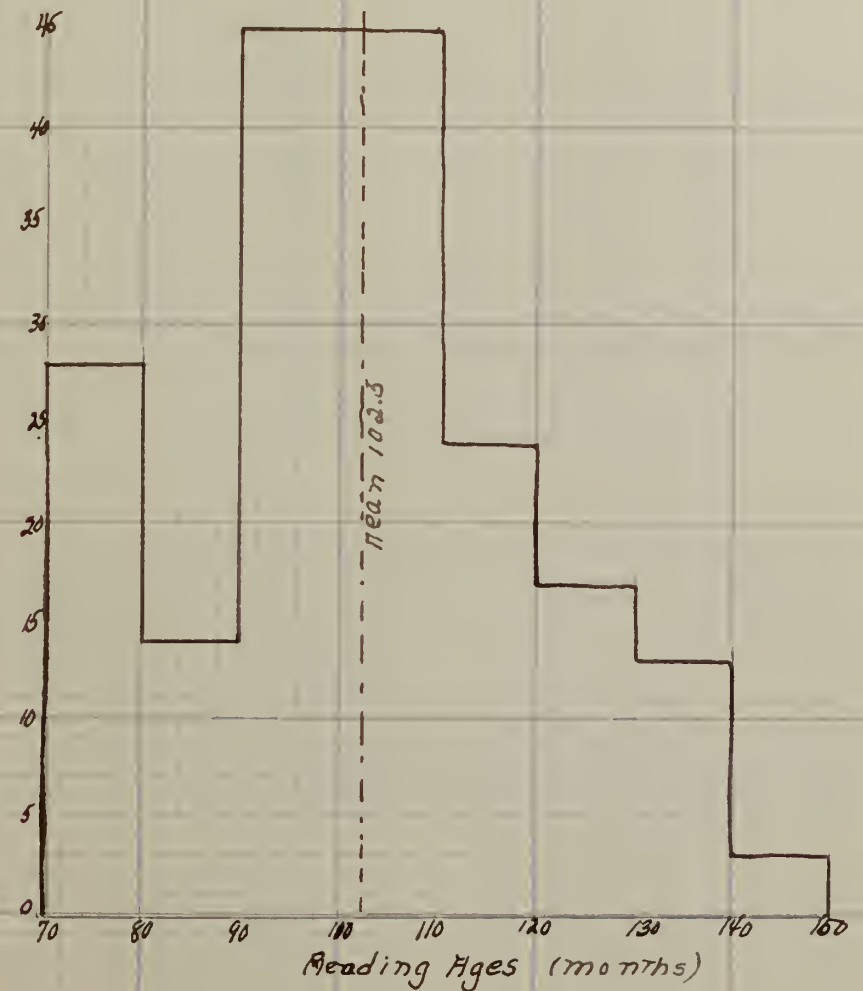
Distribution of Hearing Capacity Mental Ages

Figure V

Distribution of Stanford-Binet Mental Ages

Boston University
School of Education
Library

Figure VI

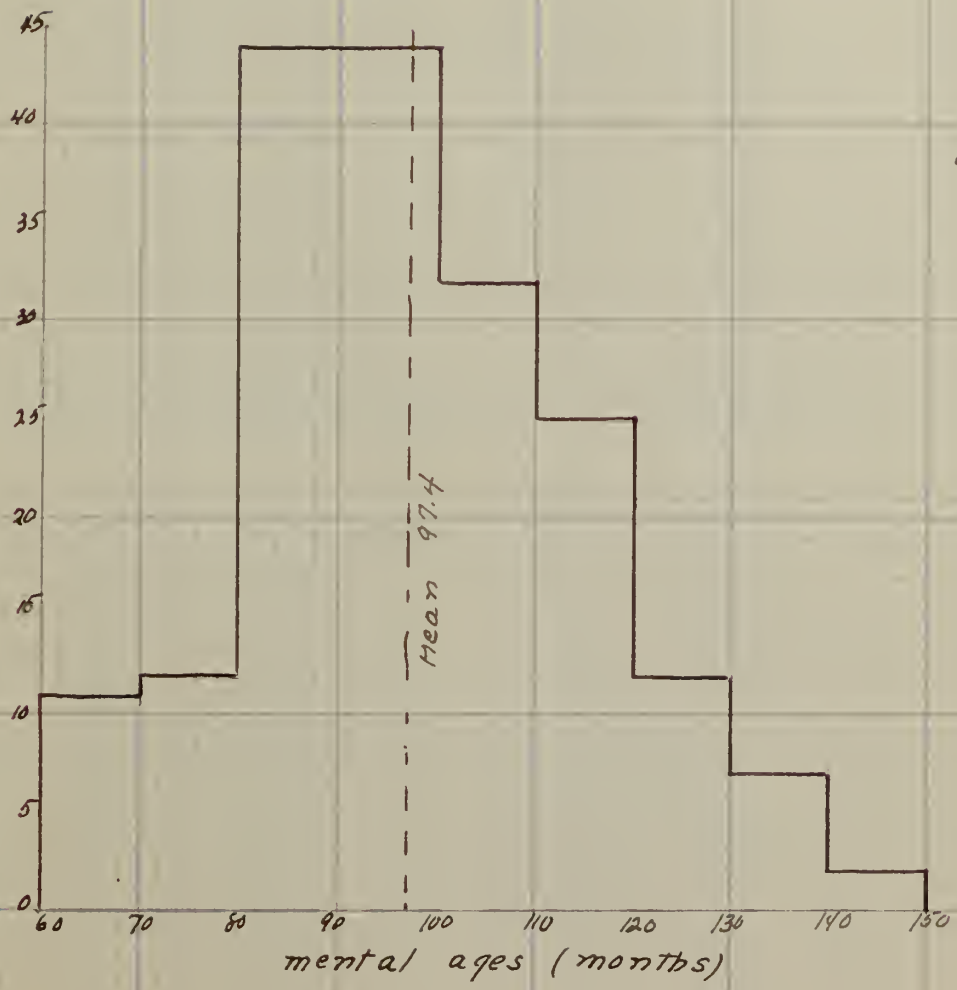


Distribution of Durrell-Sullivan Reading Ages

Figure XII

Distribution of California Test of Mental Maturity Mental Ages

Figure VIII



Distribution of Pintner-Durost Mental Ages

mental ages in order are:

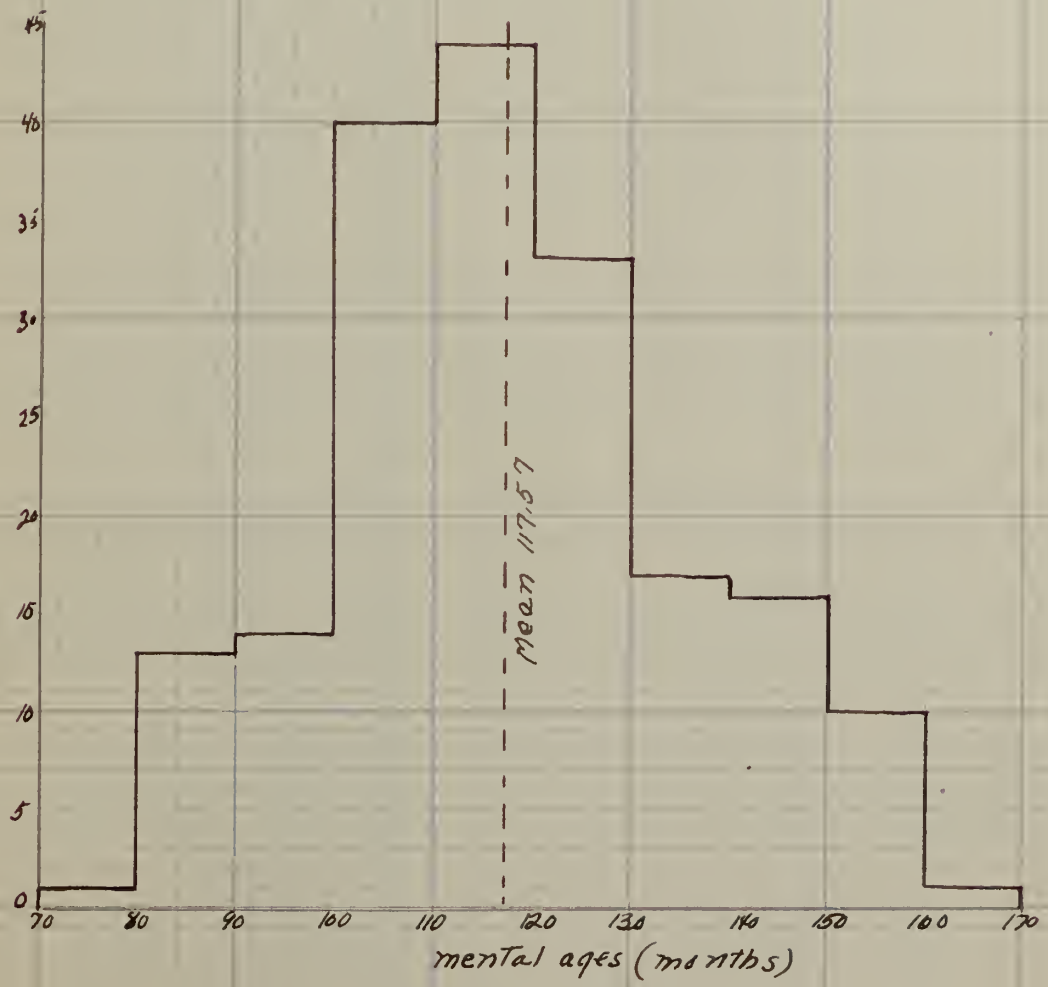
1.	Hearing Capacity Paragraphs	117.57
2.	Hearing Capacity Vocabulary	117.36
3.	Reading Achievement Paragraphs	104.05
4.	California Test of Mental Maturity, language form	102.3
5.	Reading Achievement Vocabulary	101.4
6.	California Test, non-language form	100.9
7.	Pintner-Durost, non-reading form	99.2
8.	Pintner-Durost, reading form	96.1

Figures IX to XVI show the mean scores on the various tests.

Comparison of Mean Mental Ages on Capacity Tests

Table V shows the results of a comparison of the mean mental ages for the various capacity tests.

Figure IX

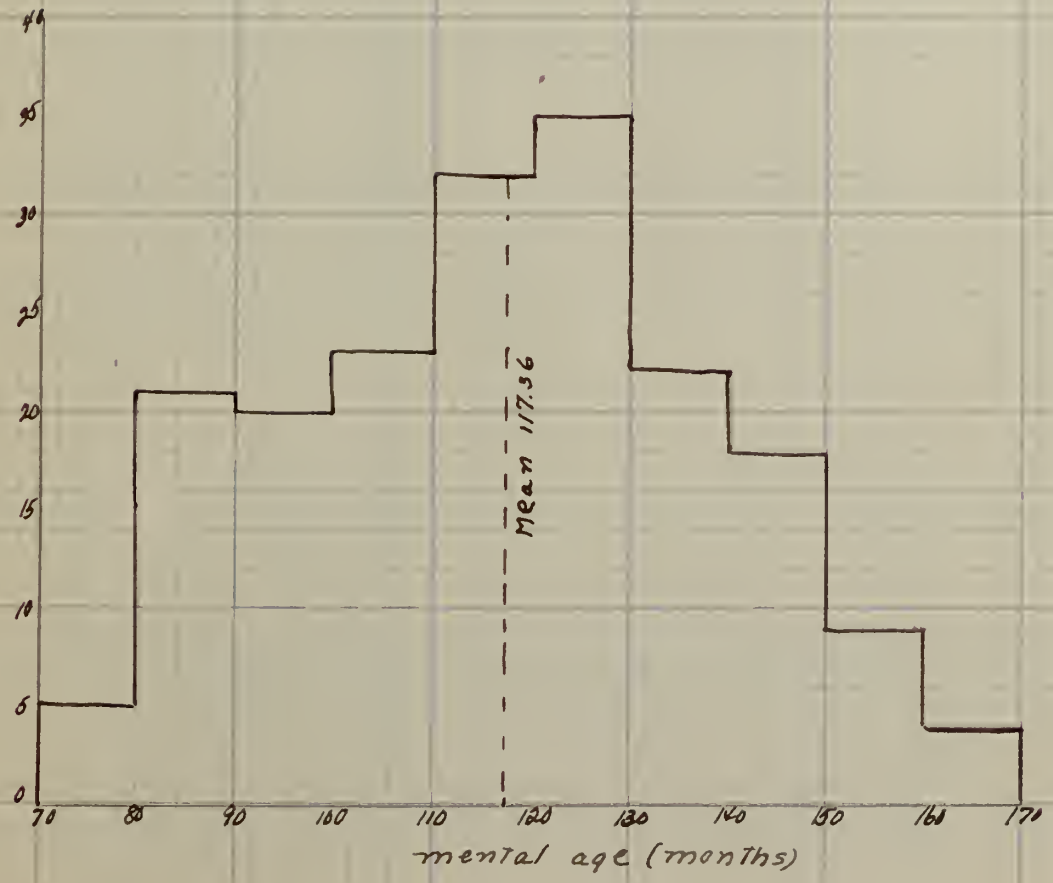


$\delta = 18.0$

Distribution of Hearing Capacity Paragraph Mental Ages

Figure X

$\sigma = 21.6$



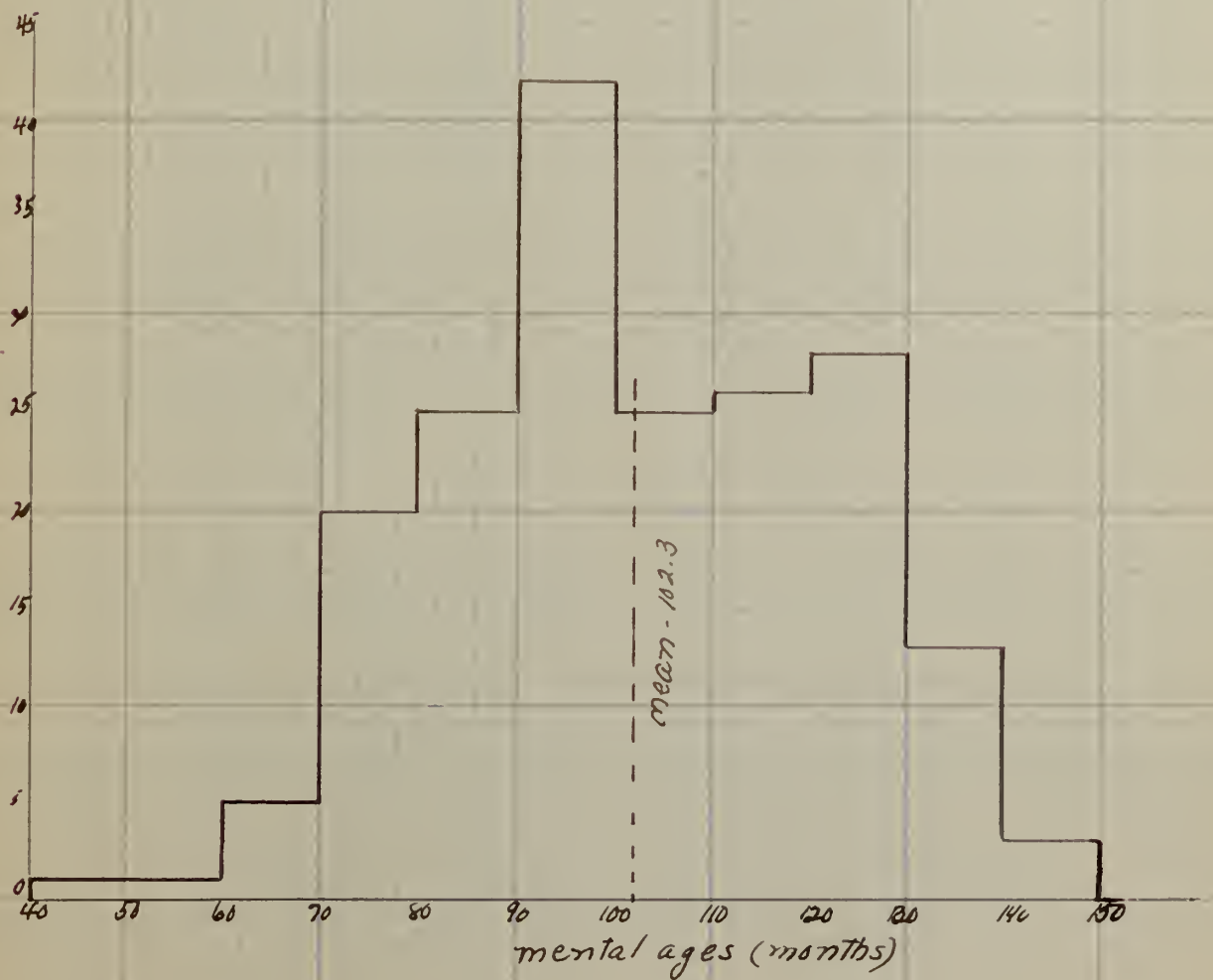
Distribution of Hearing Capacity Vocabulary Mental Ages

Figure XI

Distribution of Reading Achievement Ages, Paragraphs

Figure XII

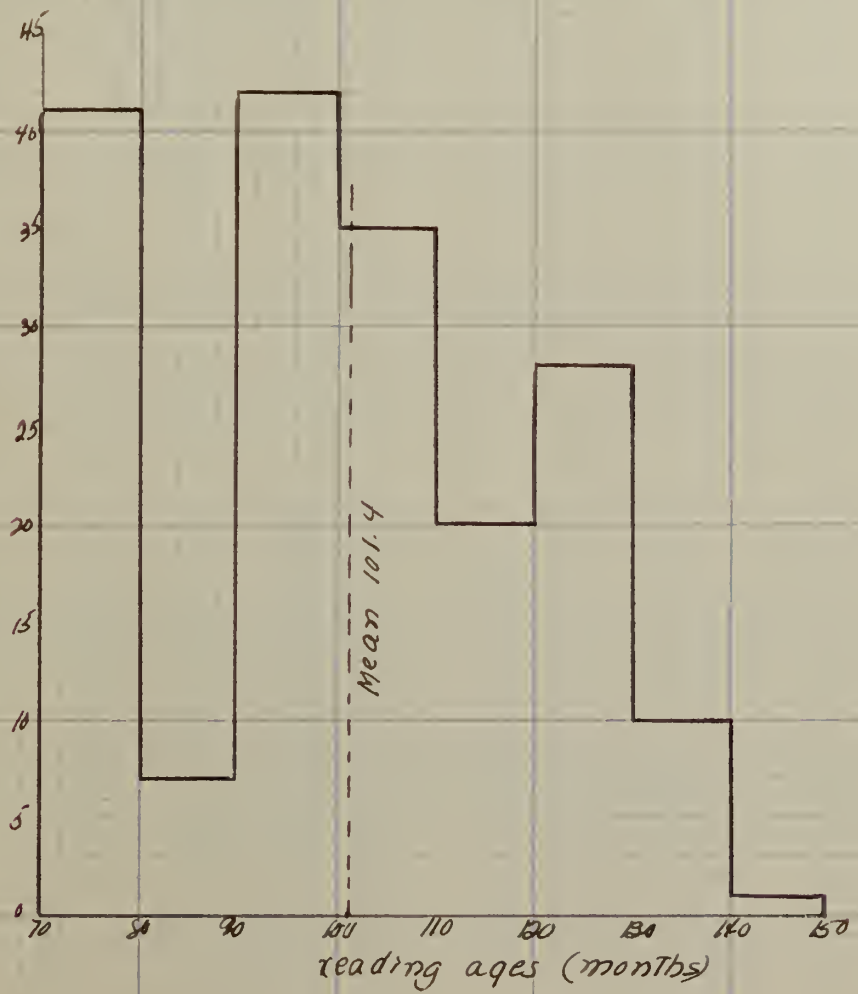
$\sigma = 19.9$



Distribution of California Test Mental Ages (Language)

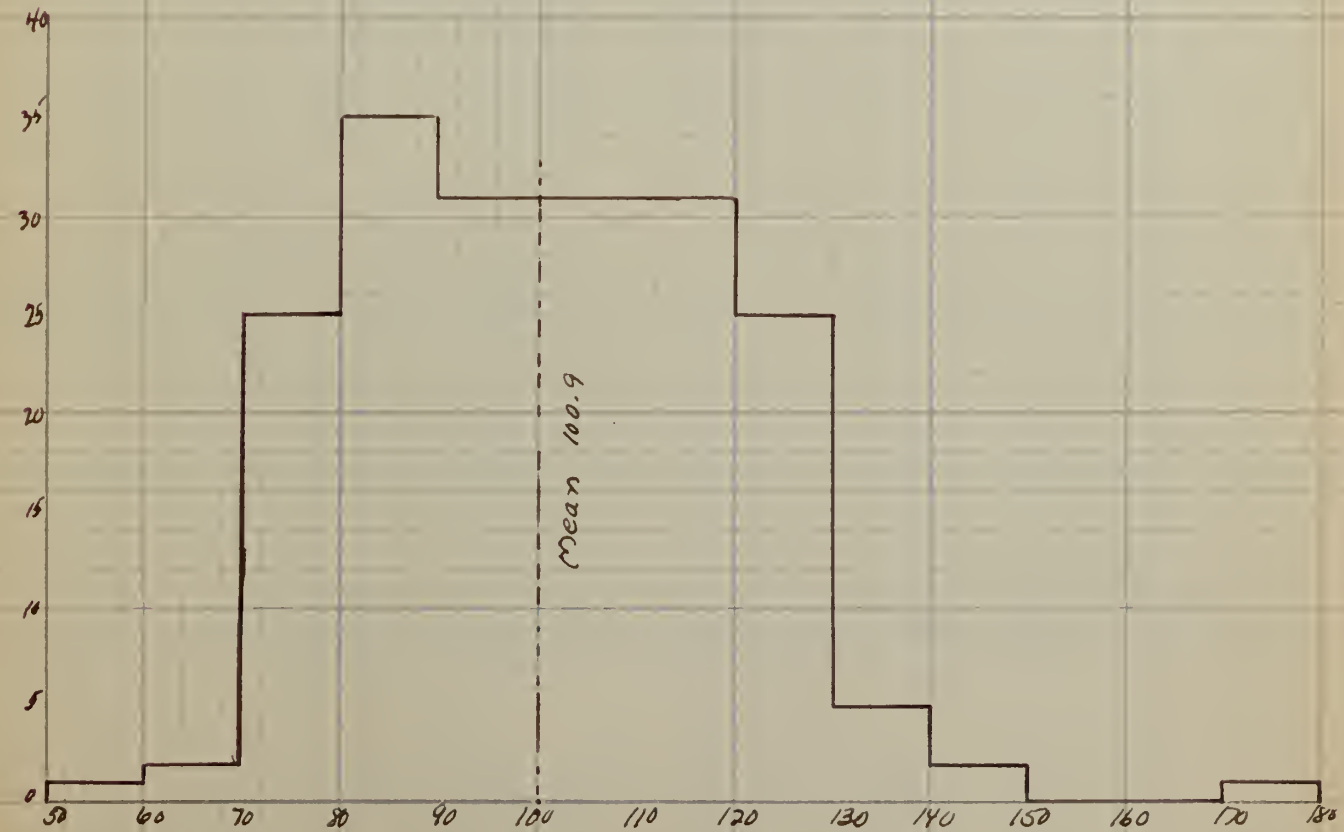
Figure XIII

$\delta = 19.2$



Distribution Reading Achievement Ages, Vocabulary

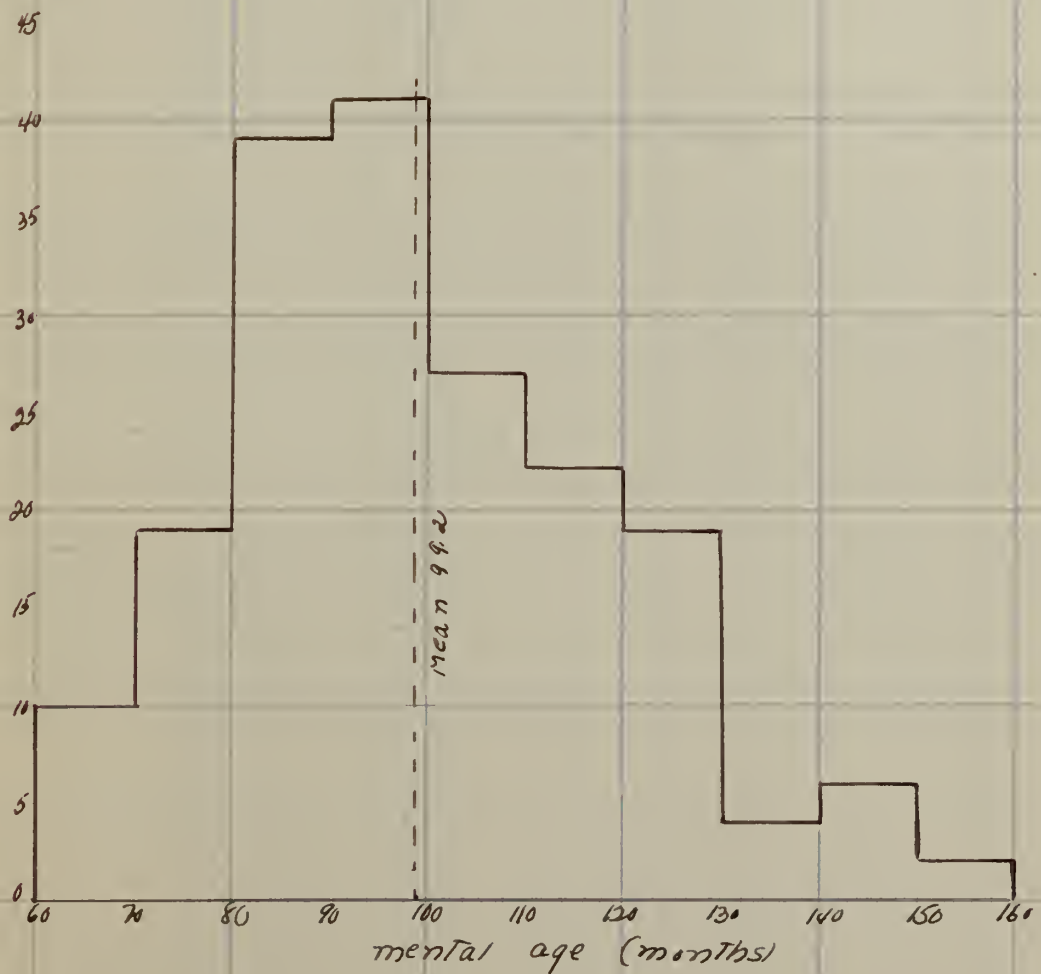
Figure XIV



Distribution of California Test-Non Language Form

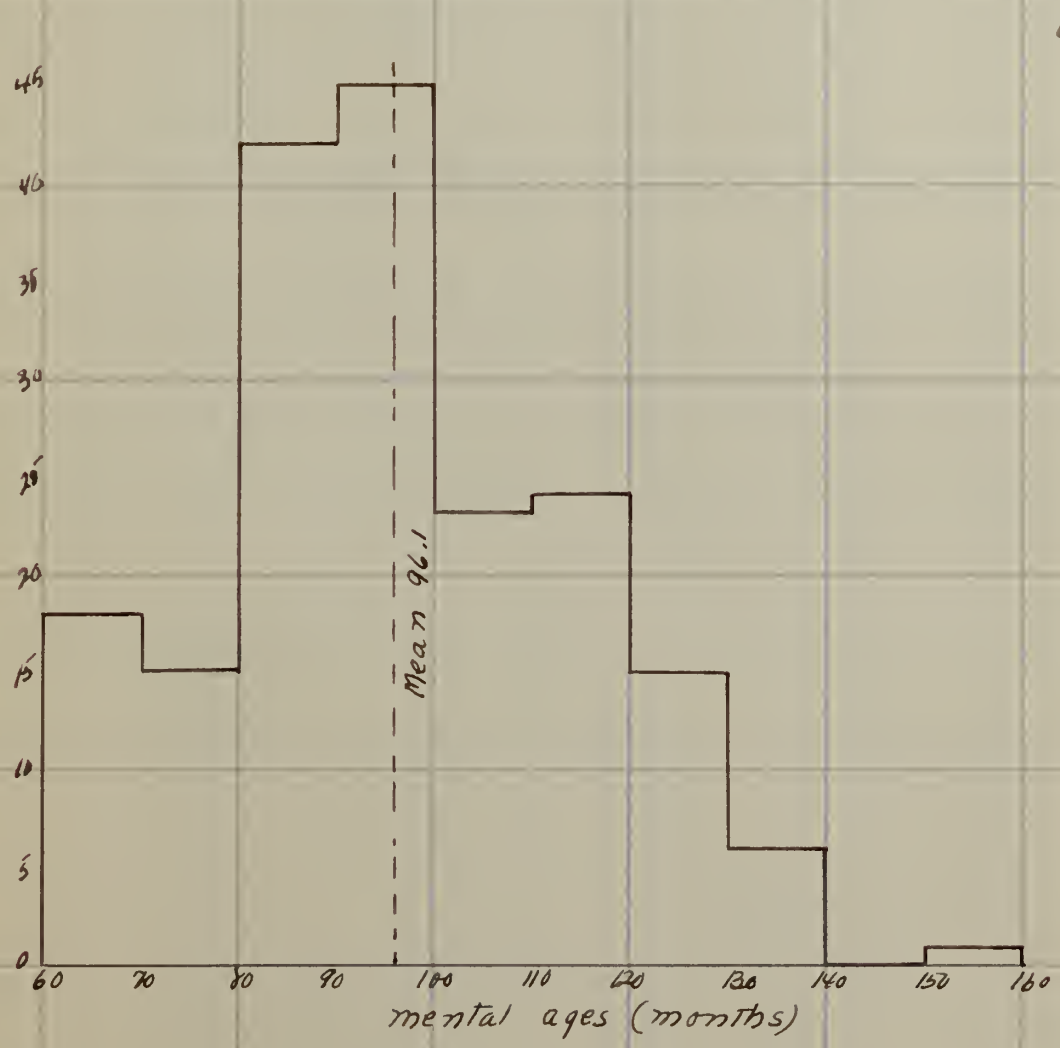
Figure XI

$\bar{\delta}$: 19.8



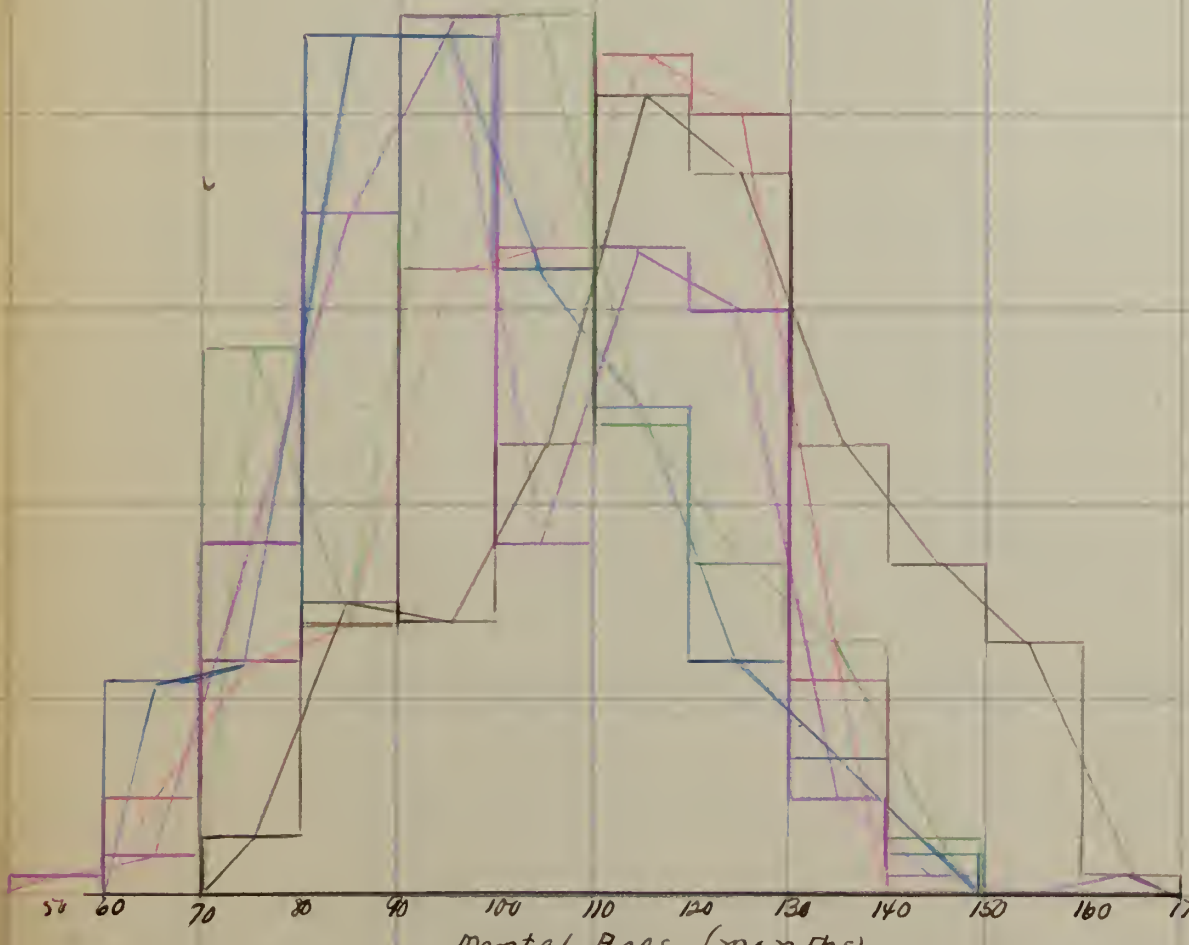
Distribution of Pintner-Durost Non-Reading Mental Ages

Figure XVI



Distribution of Pintner-Durost Mental Ages, Non-Reading form.

Figure XVII



Distribution of Various Tests of Capacity, Mental Ages.

TABLE V

Comparison of Mean Mental Ages on Capacity Tests

Test	Number of Cases	Mean Mental Age	Standard Error of the Mean	Actual Difference	Standard Error of the Difference	Critical Ratio
P-D	189	97.4	1.18	21.7	1.93	11.24
D-S		119.1	1.53			
Calif	189	101.6	1.33	17.5	2.02	8.66
D-S		119.1	1.53			
Binet	189	107.3	1.24	11.8	1.96	6.02
D-S		119.1	1.53			
Binet	189	107.3	1.24	9.9	1.71	5.78
P-D		97.4	1.18			
Calif	189	101.6	1.33	5.7	1.81	3.14
Binet		107.3	1.24			
Calif	189	101.6	1.33	4.2	1.77	2.37
P-D		97.4	1.18			

In comparing the mean mental ages for the various tests, the actual difference between the Pintner-Durost Test and the Durrell-Sullivan Hearing Capacity Tests was 21.7 months; the critical ratio 11.24 shows that the difference was statistically significant.

The mean 101.6 obtained from the California Test and the

mean 119.1 of the Durrell-Sullivan Test show a mean difference of 17.5 months, with a critical ratio of 6.02, which was statistically significant.

The mean difference between Binet and Durrell-Sullivan is 11.8 months. The critical ratio of 6.02 is significant.

The critical ratio of 5.78 shows that the mean difference between Binet and Pintner-Durost of 9.9 months is statistically significant.

Comparing the California Test and Binet gave a critical ratio of 3.14 for the mean difference of 5.7 months, which was not too great a difference.

The critical ratio for the California Test and Pintner-Durost of 2.37 was not statistically significant.

Figure XVII shows the mental age distribution on the various tests.

Significant differences were found between the following pairs of tests:

Pintner-Durost and Durrell-Sullivan

California Test and Durrell-Sullivan

Binet and Durrell-Sullivan

Binet and Pintner-Durost

California Test and Binet

California Test and Pintner-Durost

It should be noted in the above differences that the tests by which it was assumed that the same functions were being measured, were probably not testing the same mental functions

at all, which would account for the wide variances.

On each of the tests, there was great variation in the method of presentation. The Durrell-Sullivan Capacity Test on which the highest mean score was obtained, gives the child an active stimulus on each word presented, while the reading tests (Durrell-Sullivan Achievement Test, and the Reading section of the Pintner-Durost Test) after presenting several examples, allow the child to progress at his leisure with no additional directions until the command to "Stop" is given when the time limit is reached.

Too, it is possible that the different methods of response and recording the answer may have something to do with the variances in the mean scores on the individual tests.

The closest relationship was found between the Califonria Test and Pintner-Durost on which the difference was not significant. It may be that these tests are measuring more nearly common functions than the other tests, though they are all grouped under the heading of "intelligence tests".

B. Correlation of Tests of Capacity

There is a wide variance between the mean score relationships of these tests and their correlation.

Table VI shows the degree of correlation between the various tests.

Table VI

Coefficients of Correlation for Capacity Tests

Test	Number	r	σ r
Durrell-Sullivan vs California Test	189	.79	.027
Binet vs California Test	189	.78	.028
Pintner-Durost vs California Test	189	.77	.029
Pintner-Durost vs Durrell-Sullivan	189	.74	.033
Binet vs Durrell-Sullivan	189	.63	.044
Pintner-Durost vs Binet	189	.55	.051

The highest r was found between Durrell-Sullivan Capacity test and the California Test of Mental Maturity, .79 ± .027. These are both tests which do not require reading or expression of linguistic concepts on the part of the child. The California Test, though characterized by its authors as part language and part non-language, can as a whole be better classified as "non-verbal" or "non-reading", when in comparison with other general intelligence tests.

The rather high relationship between these tests can perhaps be accounted for, in that on both tests, the responses are made by picture checking. The mean age on the Durrell-Sullivan Test is 119.01 and that of the California Test is 101.3. This difference can possibly be ascribed to the fact that on the Durrell-Sullivan Test, the child is constantly prodded by the examiner each time a response is indicated, while on the California Test, on several of the sub-tests, he is given an example or two, and is told to continue in the same manner until the page is finished. On the California Test, except for a single power test on which the time is limited to two minutes, there are no restrictions or penalties for lack of speed and attention.

The other correlations are:

Binet vs California Test, r of 178 with σ r of .028.

Pintner-Durost vs California Test, r of .77, with a σ r of .029.

Pintner-Durost vs Durrell-Sullivan, r is .74, and σ r, .033.

Binet vs Durrell-Sullivan, r is .63, and σ r is .044.
Pintner-Durost vs Binet, r is .55, and σ r is .051.

The lowest correlation was found to be .55 ± .051 between the Pintner-Durost Total Test and Stanford Binet. This is much lower than the relationship found by the authors on the group on which the test was standardized. There was a large mean difference between the two tests as well.

A higher relationship could be expected because of the heavy verbal demands of both tests, Binet and the reading portion of the Pintner-Durost Test. On the Durost test, there seemed little tendency for this group to lean either to the verbal or non-verbal form of the test, as is shown in the following analysis of the verbal and non-verbal sections of the Pintner-Durost and California Tests.

C. Relationship between Verbal and Non-Verbal Forms

To discover the relationship between the reading and non-reading forms of the Pintner-Durost Test, a correlation was set up between the sections of the test. An r of .73 was found, with a σ r of .034. There was no statistical significance to the mean difference as a critical ratio of 1.63 will indicate. Thus, it would seem for this particular population and test, there is no great premium on reading ability.

The same generalization may be made of the two portions of the California Test. When a correlation was made between the language and non-language forms of the California Test of Mental Maturity, an r of .72 was found, with a σ r of .036.

The critical ratio between the two forms of this test was even smaller than that between the two forms of the Pintner-Durost Test. The critical ratio was .74 with an actual difference of 3.1 months.

Table VII shows the relationship between reading and non-reading, language and non-language test forms.

Table VII

Relation between Verbal and Non-verbal Sub-sections of the Tests

Test	Mean Mental Age	St.Error of the Means	Difference	Standard Error of the Difference	Critical Ratio
Reading, P-D	96.1	1.24			
			3.1	1.90	1.63
Non-reading, P-D	99.2	1.24			
Language, Calif.	102.3	1.45			
			1.5	2.01	.74
Non-lang. Calif.	100.8	1.38			

D. Comparison of Group Test Scores and Binet Mental Ages

The data was analyzed to discover the relationship between Binet mental age, and the ages derived from the group tests, both of capacity and reading.

The differences in mean age on Binet, which was 107.3, compared to mean ages of 96.1 on Pintner-Durost Reading Form; 117.6 on the Hearing Capacity Paragraphs; 117.4 on the Hearing

Capacity Vocabulary; 99.2 on the non-reading form of Pintner-Durost; 100.9 on the California Non-Language Test; 101.4 on the Reading Achievement Vocabulary; 102.3 on the California Language form; and 104.05 on the Reading Achievement Paragraphs, showing the following critical ratios.....of which 6.4 between Binet and Pintner-Durost Reading; 5.72 between Binet and Hearing Capacity Paragraphs; 5.05 between Binet and Hearing Capacity Vocabulary; 4.26 between Binet and Pintner-Durost Non-Reading form; 3.46 between Binet and California Non-Language Form; 3.16 between Binet and Reading Achievement Vocabulary all showed evidences of a statistically significant difference.

The critical ratiosof 2.16 between Binet and the California Language Form and 1.72 between Binet and Reading Achievement Paragraphs, were not statistically significant.

Table VIII shows a comparison of mean ages on Binet and tests of reading and capacity.

Table VIII

Comparison Between Binet Mental Ages And Group Tests

Test	Number of Cases	Mean Mental Age	Standard Error of the Mean	Actual Difference	Standard Error of the Difference	Critical Ratio
Binet	189	107.3	1.24	11.2	1.75	6.4
P-D Reading		96.1	1.24			
Binet	189	107.3	1.24	10.3	1.80	5.72
H.C.Para		117.6	1.31			
Binet	189	107.3	1.24	10.1	2.00	5.05
H.C.Voc.		117.4	1.57			
Binet	189	107.3	1.24	8.1	1.90	4.26
P.D.Non-Reading		99.2	1.44			
Binet	189	107.3	1.24	6.4	1.85	3.46
C.Non-Lang.		100.9	1.38			
Binet	189	107.3	1.24	5.9	1.87	3.16
R. Voc.		101.4	1.40			
Binet	189	107.3	1.24	5.0	1.91	2.16
C.Lang.		102.3	1.45			
Binet	189	107.3	1.24	3.25	1.88	1.72
R.Para		104.05	1.43			

E. Comparison Between Group Test Scores and Hearing Capacity

The group tests were compared with Hearing Capacity to discover whether their relationship was closer than that between group tests and Binet. The following critical ratios showed a wider difference between group tests and Hearing Capacity than between group tests and Binet mental age. All the differences shown in Table VIII were found to be statitically significant.

The comparison between Hearing Capacity and Pintner-Durost Reading Test showed the largest critical ratio of 11.73; the other critical ratios in descending order are:

Hearing Capacity and Pintner-Durost Non-reading, 9.47;
Hearing Capacity and the California Non-language Test, 8.83;
Hearing Capacity and Reading Vocabulary, 8.55;
Hearing Capacity and California Language Test, 8.07;
Hearing Capacity and Reading Paragraphs, 7.20.

These differences are shown in Table IX, a comparison between Hearing Capacity Mental age and the mental ages found on group tests.

Table IX

Comparison Between Hearing Capacity Ages and Group Tests

Test	Number of Cases	Mean Mental Age	Standard Error of the Mean	Actual Difference	Standard Error of the Difference	Critical Ratio
H.Cap.		119.1	1.53	23.0	1.96	11.73
P-DReading		96.1	1.24			
H. Cap.		119.1	1.53	19.90	2.10	9.47
P.D. non-Reading		99.2	1.44			
H. Cap.		119.1	1.53	18.20	2.06	8.83
C.Non-Lang.		100.9	1.38			
H. Cap.		119.1	1.53	17.70	2.07	8.85
R. Voc.		101.4	1.40			
H. Cap.		119.1	1.53	16.80	2.08	8.07
C. Lang.		102.3	1.45			
H. Cap.		119.1	1.53	15.05	2.09	7.20
R.Para		104.05	1.43			

F. The Relationship between Group Tests of Mental Capacity and Reading Achievement.

The group test scores were again analyzed. This final analysis was of their relationship to Reading Achievement. Table X shows the comparison of mean mental ages on capacity tests and reading ages as derived from the Durrell-Sullivan Reading Achievement Test.

Table X

Comparison Between Reading Achievement and Group Tests

Test	Number of Cases	Mean Mental Age	Standard Error of the Mean	Actual Diff.	Standard Error of the Difference	Critical Ratio
Reading		102.5	1.31	15.1	1.85	8.16
H.C.Par.		117.6	1.31			
Reading		102.5	1.31	14.9	2.04	7.30
H.C.Voc.		117.4	1.57			
Reading		102.5	1.31	6.4	1.80	3.55
P.D.Reading		96.1	1.24			
Reading		102.5	1.31	1.6	1.90	0.84
C.Non.Lang.		100.9	1.38			
Reading		102.5	1.31	3.3	1.95	.16
P.D.Non-Reading		99.2	1.44			
Reading		102.5	1.31	.3	1.95	.001
C.Lang.		102.3	1.45			

The comparison shows critical ratios between reading achievement and the two parts of the Hearing Capacity Test, of Statistical significance....8.16 between reading achievement and Hearing Capacity Paragraphs; 7.30 between reading achievement and the Hearing Capacity Paragraphs. It would seem that the group are not reading up to their capacity when either section of this test is used as a criterion of reading ability. A significant critical ratio of 3.55 was found between reading achievement and the Pintner-Durost Reading Form, as well. The ratios of 0.84 between reading achievement and the California Non-Language Test; of 0.16 between reading achievement and the Pintner-Durost Non-Reading Form; and of 0.001 between reading achievement and the California Language Test cannot be considered statistically significant.

G. The Relationship Between Binet Mental Age and Hearing Capacity Age, as Criterion of Reading Disability

The second study that was made of the data was to discover the relationship between Binet mental age and the mental age derived from the Durrell-Sullivan Hearing Capacity Test.

It would seem that there is a marked relationship between Binet mental age and Hearing Capacity for this group, when the scores are correlated, as an r of .63 ± .044 would indicate. Though the relationship above is high, there is a significant difference in the mean mental ages as shown in Table XI.

Table XI

Difference between Hearing Capacity and Binet Mental Age on Combined Data.

Number of Cases	Mean Mental Age	Mean Hearing Capacity Mental Age	Difference M 1 - M 2	Standard Error of the Difference	Difference / S.E.D.
189	107.3	119.1	11.3	1.96	6.02

In the same study, an effort was made to discover the number of children who were reading below their mental age as computed on Binet examination.

When the reading ages of the group were compared on the raw score basis, the following percentages were arrived at;

3% of the group were reading 2 or more years above mental age
11% " " 1 to 2 years " " "
23% within 1 year " " "
2% at their actual mental age
30% within 1 year below mental age
22% 1 to 2 years " " "
8% 2 years below " "
1% 3 years below " "

From this, it would seem that 31% of the children were not reading up to the capacity estimated on their Binet examination, if reading disability is considered to be one year below mental age.

Table XII shows the number of children who were reading above mental age and below mental age.

Table XII

Comparison of Reading Ages with Stanford-Binet Mental Ages *

* Table on next page

Reading Age above M.A.				same	Reading Age below M.A.			
36 mos./	24-35	12-23	1-11		1-11	12-23	24-35	36 mos./
Number of children:								
o	5	21	43	4	56	42	15	3

This shows that the greatest number of children are reading within a year of their mental age, and more reading below their capacity than up to or above it.

In the same study to determine the number of reading difficulties among special class children, reading achievement was compared to hearing capacity. When the reading ages of the group were compared on the raw score basis, the following percentages were arrived at:

1% of the group were reading 1 to 2 years above Hearing Capacity
13% within 1 year
2% at their actual capacity
20% within 1 year below Hearing Capacity
32% 1 to 2 years
20% 2 to 3 years
12% 3 or more years

From this, it would seem that 64% of the group are not reading up to their Hearing Capacity, if reading disability is considered to be a year below Hearing Capacity.

Table XIII shows the number of children who were reading above and below their Hearing Capacity Estimate.

Table XIII
Comparison of Reading Ages with Hearing Capacity Age Scores

Reading Age above H.C.:				same	ReadingAge below H.C.:			
36 mos./	24-35	12-23	1-11		1-11	12-23	24-35	36mos./
Number of children:								
o	o	3	25	4	37	60	38	22

Comparing the two tables, it seems that the children are

reading within a closer relationship to their mental age as computed on Binet, than by the Durrell-Sullivan Hearing Capacity Test.

Inclusion of the large number of non-readers in each comparison keeps the relationship between the tests from being closer. There were twenty-eight complete non-readers and thirteen others who scored very low on the Achievement Test.

H. The Achievement Quotient.

The final study made was of the achievement quotient of the group in relation to their Binet mental age and in relation to their Hearing Capacity.

Table XIV shows a comparison of accomplishment as computed on the Durrell-Sullivan Reading Achievement Test and Binet mental age. The results are expressed in months.

Table XIV

Accomplishment in Relation to Stanford-Binet Mental Age

No. of Cases	Mean Reading Age	Mean Mental Age	Difference $M_1 - M_2$	Standard Error of Difference	Difference / S.E.D.	R.A. / M.A.
189	102.5	107.3	4.8	1.80	2.66	.95

There is an actual difference of 4.8 months with a standard error of the difference on 1.80 months; a critical ratio of 2.66 is not quite statistically significant.

A correlation between Reading Age and Binet Mental Age gave an r of .68 with a σr of .039.

Table XV shows a comparison of accomplishment as measured on the Durrell-Sullivan Reading Achievement Test and mental age derived from the Durrell-Sullivan Hearing Capacity Test.

Table XV

Accomplishment in Relation to Hearing Capacity

No. of Cases	Mean Reading Age	Mean Mental Age	Difference M 1 - M 2	Standard Error of Difference	Difference / S.E.D.	R.A./ / M.A.
189	102.5	119.1	16.6	2.01	8.25	.86

The mean mental age on Hearing Capacity for the group is 16.6 months above the mean reading age for the group with a standard error of the difference of 2.01 months. The critical ratio of 8.25 is statistically significant.

A correlation of 161 with a σr of .027 was found to exist between Reading Achievement and Hearing Capacity.

Comparing the accomplishment quotients of Tables XIV and XV, it would seem that dull children fall short of what they are theoretically supposed to be able to accomplish, on both the measures of Hearing Capacity and Binet Mental Age.

SUMMARY AND CONCLUSIONS

CHAPTER V

SUMMARY AND CONCLUSIONS

The purposes of this study were twofold; the first, to discover and if possible, evaluate the mental test variations among dull children. The second purpose was to discover the frequency of reading disability among the same group, by using two criteria of ability; the Durrell-Sullivan Hearing Capacity Test and the Stanford-Binet individual examination, each in comparison with the Durrell-Sullivan Reading Achievement Test.

The tests used were:

1. Stanford-Revision of the Binet-Simon Tests
2. Durrell-Sullivan Reading Capacity Test
3. Durrell-Sullivan Reading Achievement Test
4. California Test of Mental Maturity, Primary Battery
5. Pintner-Durost General Ability Tests, Elementary Battery

Data of 185 cases tested in Lynn and Salem, Massachusetts among special class children was studied. Current mental ages were derived from Binet examinations given during the last three years. Frequency distributions were set up for all tests and their sub-sections, mental ages, IQ's and chronological ages, on the combined data. All tabulations and computations were carefully checked.

The data obtained, rather than showing conclusive findings raises many questions and suggests much future research. Some of these suggestions were outlined in the introduction of the previous chapter.

The most obvious suggestion for future research is of course an item and factor analysis of this same data for closer investigation. This would concern, not only the actual test material but also the background as suggested in Chapter IV.

Another suggestion would be that of an item analysis of all tests to determine those items having the closest relationship to reading success.

Again there is wide variance in the clarity of the test directions. The author feels that the question of hearing comprehension enters in to the test directions more seriously than in the actual body of the test itself. If the comprehension of wordy and involved directions is beyond the child's hearing capacity, he will be penalized on the test, even it is well within his capacity.

A further suggestion is of a similar study with the dull group, adding an individual performance test to a similar battery of tests.

A final study would be of the individual Binet test items to discover verbal and non-verbal tendencies of these same children as shown by success or failure on this test.

The data yielded evidence which shows a tendency to warrent these conclusions:

1. The results of the study of the different mental tests given to this group of dull children showed a very marked variation in the degree in which the tests agreed each with the other, showing a range of mean mental ages from 97.4 on the Pintner-Durost General Ability Test to 119.1 on the Durrell-Sullivan Hearing Capacity Test. Other mean mental ages were: 107.3 on Binet; 102.5 on Reading Achievement; 101.6 on the California Test of Mental Maturity. Statistically significant differences were found among all tests but between the California Test and Pintner-Durost.

Coefficients of correlation ranged from .79 ± .027 between Durrell-Sullivan and the California Test to .55 ± .51 between Pintner-Durost and Binet.

a) There was not significant difference between the verbal and non-verbal sub-sections of either the California or Pintner-Durost Tests, for this particular population.

b) The critical ratios were much higher when group test scores were compared with the Hearing Capacity mental age mean, than when they were compared with Binet mental age mean. So it would seem that these children are handicapped to a certain degree on group tests, whether they be verbal or non-verbal.

c) When the group test scores were compared to reading achievement, critical ratios ranged from 8.16 on the

Hearing Capacity Paragraphs, to .001 between Reading Achievement and the Language Form of the California Test of Mental Maturity.

We may assume that tests which seem to be measuring the same functions, are in all probability measuring unique functions, which if taken as a composite yield a profile which might be the best measure of the individual's capacity in a population of dull children. For on particular individuals, the different test estimates ranged from superior to feeble-minded. How can we be assured which is the most competent measure?

2. There was further disagreement when each test was taken in turn as a standard of criterion for reading achievement. On Binet, 31% would be considered reading disability cases, when retardation is assumed to be one full year below estimated ability. On Hearing Capacity, 64 % would be considered reading disability cases.

3. Taking both Binet mental ages and Hearing Capacity as criteria of reading ability, statistical evidence showed that they fall short of their estimated capacity on both measures..... The achievement quotient of RA/HC was .86, and for RA/MA, .96.

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APPENDIX

TABLE I. TEST SCORES IN MENTAL AGES

No.	P.D.[1]	CTMM[2]	P.D. n-R.[3]	P.D. R.[4]	CALIF n-L.[5]	CALIF L.[6]	H.C. Voc.[7]	H.C. Par.[8]	R.A. Voc.[9]	R.A. Par.[10]
1	6-10	6-1	6-10	6-10	5-10	6-4	7-6	7-11	6-0	6-0
2	5-5	5-6	5-5	5-0	5-7	5-4	7-1	6-0	6-0	6-0
3	5-3	5-7	5-3	5-0	6-5	4-1	7-1	7-0	6-0	6-0
4	6-9	5-11	6-7	6-11	6-0	5-7	7-1	7-5	6-0	6-0
5	7-6	7-9	6-11	8-0	7-7	8-0	7-11	8-4	8-4	8-8
6	7-3	8-7	7-9	6-8	8-0	9-7	10-0	9-8	7-5	6-0
7	5-7	6-8	5-7	5-0	7-2	5-9	7-0	7-1	6-0	6-0
8	5-5	6-1	5-10	5-0	6-6	5-0	7-1	7-3	6-0	6-0
9	7-5	7-8	7-5	7-4	7-3	9-7	8-8	8-4	8-4	9-0
10	5-4	5-11	5-4	5-0	5-10	5-10	7-2	7-6	6-0	6-0
11	6-10	6-9	6-7	7-1	6-9	6-6	7-5	7-11	6-0	6-0
12	5-4	7-3	5-8	5-0	6-10	8-0	7-6	7-3	7-7	6-0
13	5-7	6-1	6-1	5-0	6-2	5-10	6-4	7-2	6-0	6-0
14	6-11	6-4	6-9	7-1	5-10	7-1	7-2	7-11	6-0	9-4
15	7-1	7-11	6-7	7-7	8-4	7-6	8-6	8-9	8-3	9-0

1. P.D.-Pintner-Durost Total Mental Age.
2. CTMM-California Test of Mental Maturity, Total Mental Age.
3. P.D.,n-R-Pintner-Durost-non-reading mental age.
4. P.D.,R.-Pintner-Durost-reading mental age.
5. Calif.,n-L-California Test of Mental Maturity-non-language mental age.
6. Calif.,L.-California Test of Mental Maturity-language mental age.
7. H.C.,Voc.-Hearing Capacity Vocabulary.
8. H.C.,Par.-Hearing Capacity Paragraphs.
9. R.A.,Voc.-Reading Achievement Vocabulary.
10. R.A.,Par.-Reading Achievement Paragraphs.

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
16	6-7	7-1	6-7	5-0	7-3	6-9	7-1	7-1	6-0	6-0
17	5-2	6-4	5-3	5-0	6-1	6-3	6-7	7-7	6-0	6-0
18	7-5	8-0	7-8	7-0	7-7	9-0	9-4	9-0	6-0	6-0
19	5-4	4-3	5-8	5-0	4-6	4-3	7-1	8-3	6-0	6-0
20	8-5	7-7	8-5	5-0	7-9	7-4	7-7	8-2	6-0	6-0
21	6-7	7-5	7-5	5-9	8-10	7-2	9-2	9-11	6-0	6-0
22	6-8	7-0	6-10	6-6	6-9	7-4	7-8	10-1	6-0	8-9
23	7-9	8-1	7-11	7-6	8-2	8-0	9-0	8-1	9-0	8-1
24	7-6	8-4	7-6	7-6	8-10	7-8	9-5	9-4	7-7	7-4
25	7-4	7-0	7-11	6-8	6-7	7-8	9-7	9-11	6-0	8-4
26	6-11	7-9	7-3	6-5	7-11	7-6	8-2	10-4	6-0	8-6
27	6-8	6-9	6-4	7-0	6-5	7-2	8-0	9-0	8-8	10-1
28	6-10	9-0	6-10	6-10	9-1	9-0	10-1	10-1	8-0	6-0
29	7-2	7-9	7-2	7-2	8-10	6-7	9-4	8-7	7-8	8-9
30	6-10	7-6	6-6	7-3	7-4	7-8	7-11	8-9	7-10	6-0
31	8-6	8-7	8-11	7-2	8-8	8-6	6-9	7-6	6-0	6-0
32	6-8	6-5	6-2	6-10	6-6	6-0	7-2	9-3	7-8	8-0
33	6-11	7-3	6-7	7-2	8-0	7-6	9-8	8-11	7-5	9-5
34	7-0	6-10	6-10	7-2	7-3	6-1	7-7	8-4	6-0	8-0
35	6-8	6-8	6-2	7-1	6-5	7-1	7-8	9-4	7-6	6-0
36	7-1	6-4	6-11	7-2	6-4	6-1	8-4	7-7	7-8	6-0
37	6-9	7-7	7-4	6-1	7-9	7-4	9-11	9-3	6-0	6-0
38	7-7	6-10	7-5	7-9	6-10	6-9	8-2	10-1	8-0	8-6
39	6-5	6-10	6-3	6-7	7-1	6-3	8-3	8-8	7-5	6-0
40	7-4	6-3	6-4	7-9	6-10	5-0	6-9	8-4	6-0	6-0
41	6-5	6-7	5-9	5-11	6-10	6-0	7-0	9-5	6-0	8-2

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
42	6-9	6-4	6-5	7-1	5-10	7-1	7-7	9-3	7-11	9-1
43	7-7	7-4	7-11	7-2	7-0	7-10	9-8	9-3	8-6	8-8
44	7-8	6-2	7-10	7-6	5-7	7-2	10-4	10-1	6-0	6-0
45	7-4	8-1	7-10	6-10	7-6	9-7	11-1	8-8	8-6	9-4
46	7-2	8-2	7-9	6-7	8-2	8-3	8-6	9-8	7-7	8-0
47	7-3	9-2	7-11	6-11	9-3	9-0	12-7	12-9	6-0	6-0
48	7-4	7-5	7-6	7-1	7-7	6-11	6-7	9-8	6-0	6-0
49	5-11	6-3	6-9	5-0	6-2	6-3	8-2	8-11	6-0	7-4
50	9-4	8-7	9-9	8-10	8-10	8-3	10-7	10-8	9-4	9-4
51	7-1	7-1	7-1	5-0	7-7	6-1	7-1	7-5	6-0	6-0
52	8-1	9-3	7-9	8-4	9-7	8-9	10-4	9-9	8-0	8-9
53	7-4	7-8	7-1	7-6	7-6	7-10	8-3	8-4	8-0	8-0
54	6-0	6-8	6-3	5-8	6-7	6-7	7-7	6-8	6-0	6-0
55	7-9	7-7	7-9	7-8	7-7	7-6	9-4	9-3	6-0	9-9
56	8-5	7-0	8-5	5-0	6-7	7-8	7-5	7-3	6-0	6-0
57	8-3	8-2	8-5	8-1	8-6	7-10	8-11	9-3	7-8	8-4
58	7-5	7-0	7-0	7-9	7-4	6-11	7-11	8-11	6-0	8-8
59	9-5	10-1	8-9	10-0	10-1	10-1	10-9	10-4	9-1	9-9
60	8-11	9-9	10-1	7-8	9-9	9-10	10-5	10-1	9-1	9-1
61	7-8	7-7	8-0	7-3	8-0	6-11	10-4	10-4	7-11	6-0
62	6-6	6-8	6-7	6-4	6-9	6-3	7-5	8-4	6-0	6-0
63	8-2	7-8	9-0	7-3	8-2	8-9	10-8	9-11	7-8	9-0
64	7-4	7-8	7-9	6-10	7-5	8-3	9-0	11-1	7-10	6-0
65	7-5	9-3	8-2	6-7	9-1	9-7	10-8	12-0	7-5	7-10
66	7-11	7-3	6-11	8-11	7-3	7-2	8-11	11-4	9-4	8-2
67	8-11	9-10	9-5	8-5	9-11	10-4	11-1	10-8	8-3	8-8

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
68	7-6	9-4	8-1	6-11	8-4	10-10	11-3	10-5	8-8	8-8
69	7-11	7-10	8-7	7-2	7-4	9-0	6-10	10-0	7-5	8-2
70	8-5	7-3	8-3	8-7	7-5	6-11	9-5	8-11	8-7	7-4
71	6-6	6-9	6-5	6-6	5-10	8-9	9-8	8-9	8-8	9-4
72	6-3	6-10	6-3	5-0	7-0	6-4	7-5	7-7	6-0	6-0
73	8-2	7-8	9-8	8-8	7-2	9-4	11-10	10-5	9-9	9-9
74	7-9	8-6	8-1	7-5	7-7	10-4	10-4	10-1	9-11	8-4
75	8-5	8-9	8-3	8-6	8-4	9-4	9-9	9-11	8-6	8-8
76	8-1	8-5	8-11	7-2	7-11	9-4	8-6	8-0	8-7	8-4
77	8-1	9-3	8-8	7-6	10-1	8-0	11-5	9-3	8-6	8-9
78	8-11	10-1	9-1	8-8	9-5	11-1	13-1	12-3	8-9	10-4
79	9-5	10-1	8-9	10-0	10-1	10-1	10-9	10-4	7-7	9-0
80	8-9	9-10	9-8	7-10	9-9	10-1	10-7	12-0	8-3	8-9
81	7-5	7-11	7-3	7-6	7-6	9-0	8-11	9-11	8-0	8-8
82	8-3	8-11	9-9	6-9	9-1	8-9	12-3	12-9	7-7	6-10
83	7-1	8-2	7-4	6-9	8-6	7-10	9-0	8-11	6-0	6-0
84	8-9	10-8	9-3	8-3	10-11	10-4	11-1	12-3	7-8	10-0
85	8-9	8-11	10-2	9-5	8-10	9-0	10-11	10-0	10-4	10-4
86	9-2	10-0	9-3	9-1	10-1	9-10	11-10	14-0	10-9	8-9
87	9-2	7-8	8-7	9-9	7-3	8-9	10-9	8-9	12-0	10-8
88	8-8	7-1	8-2	6-11	6-11	7-2	9-5	8-8	11-1	9-4
89	9-3	9-2	9-0	9-6	9-1	9-4	11-3	11-1	9-1	8-9
90	7-4	6-10	6-11	7-8	6-5	7-4	8-11	8-7	8-4	6-0
91	12-3	10-3	12-0	12-6	10-4	10-7	11-1	11-1	11-1	11-1
92	9-4	9-7	9-3	9-5	9-5	9-10	11-7	12-3	11-3	11-8
93	6-10	7-10	7-4	6-4	7-7	8-3	10-4	7-6	7-8	8-0

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
94	9-6	11-5	10-8	8-3	12-4	10-4	10-4	11-1	8-4	9-5
95	7-7	7-8	6-11	8-4	7-7	7-8	8-9	10-0	7-10	10-1
96	7-9	7-10	7-8	7-9	7-6	8-6	10-1	9-11	7-7	9-1
97	6-0	6-5	5-4	6-8	6-8	5-10	7-0	7-7	7-6	6-0
98	7-8	10-0	7-5	7-11	9-5	10-10	10-9	11-1	8-9	8-9
99	7-9	7-7	7-5	8-1	7-5	7-10	10-1	9-8	7-7	7-4
100	8-6	8-10	9-0	7-11	8-10	8-9	10-7	12-0	7-7	9-8
101	10-6	10-2	10-1	10-11	9-3	11-8	11-5	12-7	10-4	11-10
102	9-4	9-10	9-10	8-10	10-1	9-7	9-11	11-8	9-5	10-1
103	11-11	10-6	12-3	11-6	10-3	10-10	12-3	12-7	10-9	11-1
104	10-7	10-0	10-7	10-6	9-9	10-4	10-9	10-3	11-0	11-1
105	7-4	6-11	6-7	8-1	6-8	7-4	7-11	9-4	9-3	8-8
106	10-9	10-1	10-2	11-3	10-5	9-7	13-1	10-5	10-8	11-1
107	8-6	9-0	8-6	8-6	8-8	9-7	9-0	9-5	8-9	9-8
108	10-2	9-10	10-1	10-3	9-7	10-4	11-3	10-8	9-11	10-0
109	10-2	9-3	10-8	9-8	9-1	9-7	11-3	10-0	8-11	9-8
110	8-8	9-4	8-2	9-2	9-7	9-0	10-11	9-9	10-3	11-4
111	9-0	9-9	9-5	8-7	9-3	10-7	11-9	10-5	8-3	10-1
112	8-10	10-6	9-10	7-10	10-9	10-1	12-6	10-4	8-2	10-8
113	9-5	8-7	9-5	9-5	9-1	8-0	9-7	9-11	8-8	9-0
114	8-6	8-5	7-9	9-3	8-6	8-3	9-9	8-6	6-0	6-0
115	7-4	7-2	7-1	7-6	6-8	8-0	10-1	9-8	7-7	8-9
116	9-8	9-10	9-11	9-6	9-5	10-7	12-1	9-8	10-5	8-9
117	8-1	8-0	7-10	8-4	8-0	8-0	11-3	9-9	11-3	10-1
118	8-11	10-3	10-5	7-4	10-1	10-7	12-1	11-1	9-1	8-9
119	9-4	10-5	9-5	9-3	10-9	9-10	10-7	11-1	9-8	9-9

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
120	10-7	9-5	10-5	10-8	10-1	8-6	11-3	10-8	11-7	11-8
121	9-1	10-10	9-1	9-1	11-1	10-4	10-9	9-5	10-3	6-0
122	8-9	10-3	9-9	7-8	9-7	11-4	13-6	12-9	8-0	8-4
123	8-9	9-1	8-2	9-3	8-6	7-10	9-7	9-5	9-1	8-8
124	9-5	10-5	10-8	8-1	10-1	10-10	11-7	10-5	7-11	8-4
125	8-3	10-3	8-7	7-11	9-9	11-1	12-7	11-4	9-3	10-4
126	9-6	9-8	10-9	8-2	10-3	8-9	7-5	8-9	9-0	8-6
127	9-11	10-2	10-1	9-9	10-3	10-1	11-10	12-0	10-3	9-9
128	6-11	6-8	7-3	6-6	6-6	6-9	7-11	8-9	6-0	6-0
129	5-8	6-3	5-2	6-1	6-4	6-0	6-0	7-1	6-0	6-0
130	8-0	7-9	8-5	7-6	7-9	7-10	9-9	8-7	9-5	9-4
131	9-4	8-9	8-10	9-9	9-2	9-7	8-9	11-8	9-11	12-7
132	9-1	9-9	8-9	9-5	9-5	10-4	10-9	10-8	10-7	10-0
133	10-3	10-5	10-5	10-1	10-7	10-1	10-9	10-5	11-5	12-2
134	11-3	11-8	11-11	10-5	11-10	11-4	11-10	12-0	10-4	10-4
135	7-10	7-10	7-2	8-7	7-9	8-3	11-1	8-4	11-3	9-8
136	10-6	9-5	9-11	10-11	8-6	10-10	11-9	12-7	10-5	10-11
137	10-9	10-8	11-8	9-11	10-7	10-10	11-3	12-9	10-9	11-5
138	6-6	6-6	6-9	6-3	6-2	6-11	9-11	9-4	6-0	6-0
139	9-8	10-2	9-1	10-5	10-5	9-10	13-6	10-5	10-1	9-4
140	11-10	10-6	12-6	9-6	10-11	9-11	10-9	10-11	10-5	9-1
141	7-10	9-4	7-8	7-11	9-3	9-7	10-11	8-11	8-9	9-0
142	10-3	9-5	9-7	10-11	9-7	9-4	10-4	10-8	11-1	10-11
143	11-5	10-11	12-11	9-10	9-5	10-7	12-1	11-1	10-3	11-10
144	5-5	6-3	5-5	5-0	6-4	6-0	6-4	7-3	6-0	6-0
145	8-8	7-10	7-9	9-6	8-6	7-2	9-5	9-8	10-1	9-9

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
146	8-8	7-9	9-7	7-9	8-10	6-5	9-3	9-4	6-0	8-4
147	8-0	7-9	7-11	8-1	7-9	7-10	8-9	9-0	9-7	9-9
148	8-1	10-3	8-7	7-7	10-1	10-7	8-9	11-4	8-6	9-4
149	9-0	9-3	9-0	9-0	9-5	9-0	11-3	10-5	10-9	11-1
150	7-6	9-3	8-2	6-10	8-6	10-4	10-0	10-11	8-2	8-2
151	7-4	8-0	7-2	7-5	8-6	7-6	9-11	9-1	7-7	7-10
152	6-8	7-6	6-10	6-6	7-2	8-3	8-9	9-5	6-0	6-0
153	7-8	9-9	8-3	7-3	9-7	10-1	8-7	8-5	8-7	8-9
154	8-3	7-7	8-0	8-5	7-4	8-0	9-5	8-8	8-8	8-6
155	8-1	7-7	7-5	8-4	7-7	7-6	8-7	9-9	9-0	9-4
156	11-7	10-10	12-4	10-9	10-3	11-8	12-3	11-4	10-1	9-5
157	9-9	10-0	9-5	10-0	10-5	9-4	9-11	9-0	9-9	10-0
158	7-7	7-8	6-11	8-2	7-4	8-9	9-11	10-0	8-4	7-10
159	11-2	10-6	12-2	10-2	9-11	9-10	12-3	11-8	10-9	10-11
160	8-4	8-2	7-7	9-1	7-9	9-4	8-7	9-1	10-3	9-1
161	8-7	7-1	7-11	8-8	7-2	6-11	9-4	9-0	9-4	9-4
162	9-10	10-1	10-11	8-9	10-9	8-0	11-7	10-8	10-1	8-9
163	8-10	8-3	9-9	7-11	8-9	8-9	8-11	9-8	7-10	8-4
164	7-7	6-11	7-5	7-8	6-8	7-2	9-3	9-11	8-0	9-4
165	8-4	7-3	7-6	9-2	7-4	7-1	9-7	9-0	8-8	8-4
166	10-10	10-3	11-4	10-3	10-9	9-7	12-11	13-0	10-3	10-4
167	7-11	9-9	8-3	7-7	9-3	11-1	12-9	12-7	7-5	8-2
168	9-4	7-6	7-11	10-9	7-4	7-10	9-4	7-1	9-0	9-1
169	7-5	7-9	7-8	7-1	7-7	8-0	10-5	9-0	10-0	9-1
170	8-6	9-7	9-1	7-10	9-1	10-4	12-9	11-8	7-10	9-4
171	8-1	8-2	9-1	7-2	8-4	8-0	9-3	9-5	9-7	9-0

No.	P.D.	CTMM	P.D. n-R.	P.D. R.	CALIF n-L.	CALIF L.	H.C. Voc.	H.C. Par.	R.A. Voc.	R.A. Par.
172	8-7	9-10	8-0	9-2	9-7	10-4	8-11	9-9	9-9	10-0
173	9-10	9-8	10-1	9-7	10-5	8-6	12-3	10-1	9-4	9-8
174	7-6	7-11	8-0	7-0	7-7	8-9	10-9	12-0	8-2	8-4
175	7-5	7-6	6-11	7-11	7-5	7-6	10-1	9-8	8-0	9-0
176	9-10	10-2	9-5	10-2	9-7	11-1	9-11	9-8	11-4	10-4
177	10-4	10-6	10-0	10-7	10-5	10-7	11-9	12-0	9-3	10-4
178	8-2	9-4	8-7	7-8	9-5	9-4	11-1	9-8	8-7	9-5
179	9-9	9-2	10-3	9-3	9-3	9-0	10-0	11-1	10-0	10-0
180	8-11	9-8	9-10	8-0	9-7	9-10	11-9	8-9	6-0	6-0
181	6-6	7-4	6-8	6-4	6-2	8-0	9-5	9-4	6-0	6-0
182	10-1	10-11	10-11	9-3	11-1	10-7	12-11	12-3	9-9	10-4
183	11-0	9-8	10-7	11-5	9-1	10-7	13-6	11-4	10-5	9-4
184	8-1	8-10	8-4	7-10	7-11	10-4	11-10	12-3	8-2	8-9
185	7-9	8-7	7-10	7-7	8-10	8-3	10-5	8-7	10-7	9-4
186	9-9	13-5	10-4	9-3	14-2	12-0	12-1	12-9	8-11	8-9
187	9-9	10-2	11-0	8-8	9-9	10-10	13-8	11-7	9-11	9-0
188	7-2	7-3	6-11	7-5	6-3	7-6	9-4	8-8	6-0	7-4
189	7-6	7-5	7-7	7-10	10-10	8-9	10-4	9-11	8-7	8-9

TABLE II. FREQUENCY OF READING DIFFICULTY

Case	Sex	C.A.[1]	IQ	M.A.[2]	H.C.[3]	R.A.[4]	R.A. below M.A.	R.A. above M.A.	R.A. below H.C.	R.A. above H.C.
1	M	7-10	79	6-2	7-8	6-0	2		20	
2	M	8-1	75	6-1	6-7	6-0	1		7	
3	F	8-5	83	7-0	6-9	6-0	12		9	
4	M	8-6	74	6-3	7-2	7-2		11		
5	F	8-9	95	8-4	8-2	8-6	2			4
6	M	8-10	93	8-3	9-8	7-3	12		29	
7	M	8-11	78	5-5	6-9	6-0		7	9	
8	M	9-0	75	6-9	7-1	6-0	9		13	
9	M	9-0	87	7-10	8-1	8-7		9		6
10	F	9-5	67	6-4	7-3	6-0	4			15
11	F	9-5	63	5-11	8-2	6-0		1	26	
12	M	9-5	63	5-11	7-3	7-5		18		2
13	M	9-6	67	6-4	6-5	6-0	4		5	
14	F	9-9	58	5-8	7-6	7-11		27		5
15	F	9-10	73	7-2	8-8	8-7		17	1	
16	M	9-11	80	7-11	7-1	6-0	23		13	
17	M	10-2	74	7-6	7-0	6-0	18		12	
18	M	10-3	69	7-1	9-4	7-3		2	25	
19	F	10-4	51	5-3	7-6	6-0		9	18	
20	F	10-5	73	7-7	7-10	6-0	19		22	
21	M	10-5	79	8-3	9-1	6-0	27		37	

1. C.A.-Chronological Age
2. M.A.-Mental Age
3. H.C.-Hearing Capacity Age
4. R.A.-Reading Age

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below H.C.	R.A. above H.C.
22	M	10-5	78	8-2	9-0	7-8	6		16	
23	M	10-6	76	8-0	8-9	8-6		6	3	
24	M	10-6	77	8-1	9-7	7-8	5		23	
25	M	10-6	80	8-5	9-11	7-8	9		27	
26	M	10-7	82	8-8	9-4	7-8	12		20	
27	M	10-7	83	8-9	8-7	9-3		6		8
28	M	10-7	74	7-10	10-4	7-8	2		32	
29	M	10-7	78	8-3	9-0	8-2	1		10	
30	M	10-8	74	7-11	8-4	7-8	3		8	
31	M	10-9	93	10-0	6-10	6-0	48		10	
32	M	10-10	76	8-3	8-3	7-10	5		5	
33	F	10-10	67	7-3	9-5	8-2		11	15	
34	F	10-11	60	6-6	7-11	7-6		12	5	
35	M	10-11	63	6-10	8-7	7-6		8	13	
36	M	10-11	61	6-8	7-11	7-7		11	4	
37	M	10-11	75	8-2	9-9	6-0	26		45	
38	M	10-11	75	8-2	9-3	8-3		1	12	
39	F	11-0	69	7-6	8-7	7-3	3		16	
40	F	11-0	60	6-7	7-5	6-0	7		17	
41	M	11-0	75	8-3	8-2	7-5	10		9	
42	M	11-1	52	5-9	8-6	8-4		31	2	
43	M	11-2	70	7-10	9-8	8-7		9	13	
44	M	11-3	73	8-2	10-5	6-0	26		53	
45	M	11-4	65	7-4	10-0	8-9		17	15	
46	M	11-5	78	8-11	9-3	7-10	13		17	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below H.C.	R.A. above H.C.
47	M	11-5	86	9-10	12-9	7-5	29		64	
48	F	11-6	80	9-2	8-0	7-3	23		9	
49	F	11-6	55	6-4	8-7	7-2		10	17	
50	M	11-7	73	8-5	10-9	9-4		11	17	
51	M	11-7	67	7-9	7-1	6-0	21		13	
52	M	11-9	85	10-0	10-3	8-3	21		24	
53	M	11-9	69	8-1	8-4	8-0	1		4	
54	M	11-9	71	8-4	7-1	6-0	28		13	
55	M	11-10	73	8-7	9-5	7-11	8		18	
56	F	11-10	60	7-1	7-2	6-0	13		14	
57	F	11-11	72	8-7	9-4	7-11	8		17	
58	M	11-11	73	8-8	8-6	7-10	10		8	
59	M	11-11	85	10-1	10-9	9-4	9		17	
60	M	11-11	77	9-2	10-7	9-1	1		18	
61	F	11-11	80	9-6	10-7	7-10	20		33	
62	M	11-11	59	7-0	7-10	6-0	12		22	
63	M	12-0	73	8-9	10-7	8-2	7		29	
64	F	12-0	65	7-9	10-1	7-8	1		29	
65	M	12-0	85	10-2	11-4	7-6	32		46	
66	F	12-1	70	8-5	10-1	8-11		6	16	
67	M	12-1	86	10-4	11-1	8-6	22		31	
68	M	12-2	76	9-3	11-1	8-8	7		29	
69	M	12-2	77	9-4	8-4	7-8	20		8	
70	F	12-3	72	8-10	9-4	8-3	7		13	
71	M	12-3	58	7-1	9-4	8-3		14	13	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below H.C.	R.A. above H.C.
72	F	12-3	68	8-4	7-5	6-0	28		17	
73	M	12-5	76	9-5	11-5	9-9		4	20	
74	F	12-5	75	9-4	10-5	8-0	16		29	
75	M	12-5	76	9-5	10-0	8-7	10		17	
76	M	12-5	68	8-5	8-4	8-6		1		2
77	M	12-6	82	10-3	10-7	8-7	10		24	
78	M	12-6	86	10-9	12-10	9-4	17		42	
79	M	12-6	75	9-4	11-0	8-2	14		34	
80	M	12-7	80	10-1	11-3	8-6	19		33	
81	M	12-8	81	10-3	9-7	8-3	24		16	
82	M	12-9	78	10-0	12-7	7-8	28		61	
83	F	12-10	62	8-0	9-1	6-0	24		37	
84	M	12-11	82	10-7	11-8	8-7	24		37	
85	F	12-11	78	10-1	10-9	10-4		3	5	
86	M	12-11	74	9-6	12-9	10-1		7	32	
87	M	12-11	78	10-2	9-9	11-7		17		22
88	F	13-0	69	8-11	9-3	10-5		18		14
89	M	13-0	83	10-10	11-4	9-0	22		28	
90	M	13-0	51	6-8	8-9	8-0		16	9	
91	F	13-2	80	10-5	11-4	11-1		8	3	
92	M	13-3	74	9-9	12-0	11-8		23	4	
93	M	13-3	70	9-2	10-0	7-10	16		26	
94	M	13-3	85	11-2	10-9	8-9	29		24	
95	F	13-4	50	6-8	9-5	8-8		24	9	
96	M	13-4	61	8-1	10-3	8-2		1	25	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below R.C.	R.A. above R.C.
97	F	13-4	48	6-4	7-2	7-5		13		3
98	M	13-5	77	10-5	12-3	8-9	20		42	
99	F	13-5	71	9-5	10-1	7-8	21		29	
100	M	13-5	83	11-0	11-3	8-4	32		35	
101	F	13-6	83	11-0	12-0	11-0	0		12	
102	M	13-7	70	9-4	10-9	9-9		5	12	
103	M	13-7	81	10-10	12-6	11-4		6	14	
104	M	13-7	79	10-7	10-3	10-3	4		0	
105	F	13-8	56	7-6	8-7	9-1		19		5
106	M	13-8	81	10-10	12-2	10-11		1	15	
107	M	13-9	71	9-7	9-5	9-1	6		4	
108	M	13-10	74	10-1	11-3	9-11	2		16	
109	M	13-10	78	10-7	10-11	9-3	16		20	
110	M	13-10	71	9-7	10-7	10-8		13		1
111	M	13-11	80	10-10	11-4	8-11	23		29	
112	M	13-11	67	9-1	11-8	9-1	0		31	
113	F	13-11	71	9-7	9-11	8-9	10		14	
114	F	13-11	74	10-0	9-7	6-0	48		43	
115	F	14-0	63	8-7	10-1	8-0	7		25	
116	M	14-0	78	10-8	11-0	9-11	9		13	
117	F	14-0	70	9-6	10-9	10-11		17		2
118	M	14-1	75	10-3	11-10	9-0	15		34	
119	M	14-1	71	9-9	11-0	9-9	0		15	
120	F	14-1	75	10-3	11-3	11-8		17		5
121	M	14-2	69	9-6	10-4	9-0	6		16	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below R.C.	R.A. above R.C.
122	M	14-2	72	9-10	13-2	8-2	20		60	
123	F	14-2	68	9-4	9-8	8-11	5		9	
124	M	14-2	67	9-2	11-4	8-0	14		40	
125	M	14-2	68	9-4	12-3	9-8		4	31	
126	M	14-2	68	9-6	8-0	8-9	9			9
127	F	14-2	75	10-3	12-1	10-1	2		24	
128	F	14-3	53	7-4	8-4	7-3	1		13	
129	F	14-3	63	8-8	7-3	7-3	17		0	
130	F	14-3	60	8-3	9-4	9-5		14		1
131	M	14-4	75	10-5	10-1	10-11		6		10
132	M	14-5	65	9-0	11-0	10-5		17	7	
133	M	14-5	71	9-10	10-11	11-10		24		11
134	M	14-5	83	11-6	12-1	10-4	14		21	
135	M	14-5	67	9-4	9-9	10-9		17		12
136	M	14-5	67	9-4	12-2	10-8		16	18	
137	M	14-6	73	10-2	12-0	11-1		11	11	
138	F	14-6	56	7-10	9-9	7-3	7		30	
139	F	14-6	72	10-1	12-6	9-11	2		31	
140	F	14-7	75	10-6	11-0	10-0	6		12	
141	F	14-7	66	9-3	10-1	8-11	4		14	
142	M	14-7	62	8-8	10-8	11-0		28		4
143	M	14-7	70	9-10	11-10	11-1		15	9	
144	F	14-8	47	6-7	6-7	6-0	5		5	
145	M	14-9	59	8-4	9-8	10-0		20		4
146	M	14-9	63	8-11	9-4	7-6	17		22	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below R.C.	R.A. above R.C.
147	M	14-9	71	10-0	9-0	9-8	4			8
148	M	14-10	60	8-6	10-0	8-9		3	15	
149	M	14-10	75	10-8	11-1	11-0		4	1	
150	M	14-10	72	10-3	10-3	8-2	25		25	
151	F	14-10	62	8-10	9-8	7-8	14		24	
152	M	14-11	53	7-6	9-4	6-0	18		40	
153	M	14-11	62	8-10	9-3	8-8	2		7	
154	M	14-11	58	8-3	9-3	8-8		5	7	
155	F	14-11	60	8-6	9-4	9-1		7	3	
156	M	14-11	78	11-1	12-1	9-11	14		26	
157	M	14-11	65	9-3	9-8	9-11		8		3
158	F	15-0	67	9-7	10-1	8-2	7		13	
159	M	15-2	72	10-4	12-2	10-11		7	15	
160	M	15-2	66	9-6	9-0	9-11		5		11
161	F	15-3	63	9-2	9-4	9-4		2	0	
162	M	15-3	72	10-5	11-4	9-8	9		20	
163	F	15-4	62	9-0	9-5	8-0	12		17	
164	M	15-4	58	8-5	9-8	8-6		1	14	
165	M	15-4	66	9-7	9-5	8-7	12		10	
166	M	15-5	75	10-8	13-0	10-4	4		32	
167	M	15-5	62	9-0	12-9	7-8	16		61	
168	M	15-5	66	9-7	8-4	9-1	6			9
169	M	15-5	65	9-5	9-11	9-9		4	2	
170	M	15-6	68	9-11	12-6	8-4	19		50	
171	F	15-7	67	9-10	9-5	9-4	6		1	

Case	Sex	C.A.	IQ	M.A.	H.C.	R.A.	R.A. below M.A.	R.A. above M.A.	R.A. below R.C.	R.A. above R.C.
172	F	15-7	65	9-7	9-5	9-11		4		6
173	M	15-7	64	9-5	11-5	9-5	0		24	
174	M	15-8	58	8-6	11-4	8-3	3		37	
175	F	15-8	62	9-1	10-1	8-4	9		21	
176	M	15-9	72	10-8	10-4	11-0		4		8
177	M	15-9	72	10-8	12-0	9-8	12		28	
178	M	15-10	72	10-8	10-7	8-11	21		20	
179	M	15-11	68	10-1	10-8	10-0	1		8	
180	M	15-11	74	11-0	10-4	6-0	60		52	
181	M	16-0	52	7-9	7-7	6-0	21		43	
182	M	16-0	73	10-11	12-9	10-0	11		33	
183	M	16-2	72	10-9	12-10	10-0	9		34	
184	M	16-2	55	8-3	12-2	8-6		3	44	
185	M	16-2	57	8-6	9-8	10-1		19		5
186	M	16-3	69	10-5	12-6	8-11	18		43	
187	M	16-7	64	9-7	13-8	8-11	8		57	
188	M	16-10	68	10-2	9-1	7-5	33		20	
189	M	18-1	53	8-0	10-4	8-8		8	20	

DURRELL-SULLIVAN
READING CAPACITY AND ACHIEVEMENT TESTS

READING CAPACITY TEST

By Donald D. Durrell
Professor of Education and Director of the Educational Clinic
Boston University

and Helen Blair Sullivan
Associate Director of the Educational Clinic
Boston University

Inter.
Capacity
A

INTERMEDIATE TEST: FORM A

For Grades 3 to 6

Name.....Grade.....Teacher.....Boy or girl.....

Age.....When is your next birthday?.....How old will you be then?.....

Name of school.....City.....Date.....

Test	Score	Grade Equivalent	Age Equivalent
1. Word Meaning			
2. Paragraph Meaning			
Total			

Patent No. 1,586,628

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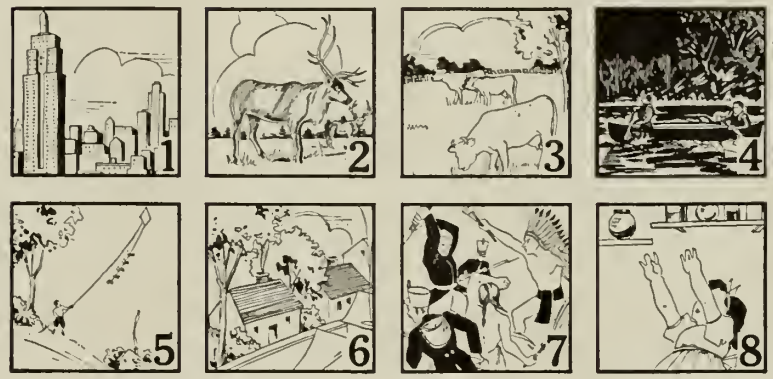
TEST 1. WORD MEANING

I

A( )
B( )
C( )
D( )
E( )

II



A( )
B( )
C( )
D( )
E( )

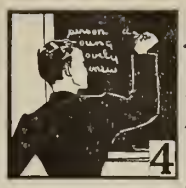
III

A( )
B( )
C( )
D( )
E( )

IV

A( )
B( )
C( )
D( )
E( )

V



A ( )
B ( )
C ( )

D ( )
E ( )

VI

A ( )
B ( )
C ( )

D ( )
E ( )

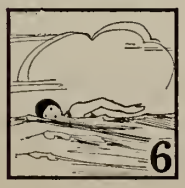
VII

A ( )
B ( )
C ( )

D ( )
E ( )

VIII

A ( )
B ( )
C ( )



D ( )
E ( )

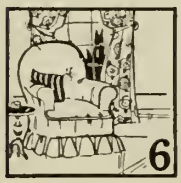
IX

A( )
B( )
C( )

D( )
E( )

X

A( )
B( )
C( )



D( )
E( )

XI

A( )
B( )
C( )

D( )
E( )

XII

A( )
B( )
C( )

D( )
E( )

XIII

A( )

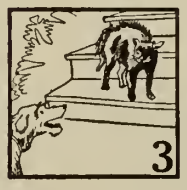
B( )

C( )

D( )

E( )

XIV



A( )

B( )

C( )

D( )

E( )

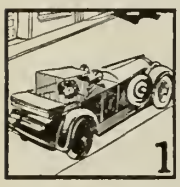
Score.....

TEST 2. PARAGRAPH MEANING

I

A( )

B( )



C( )

D( )

E( )

II

A( )

B( )

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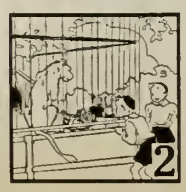

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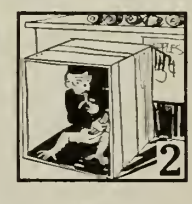

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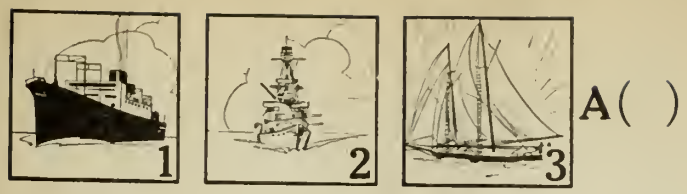

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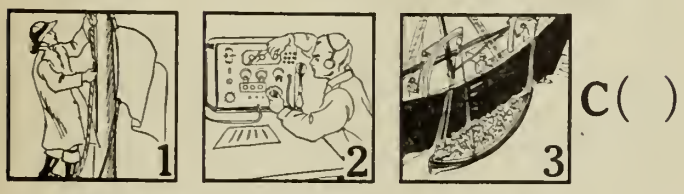

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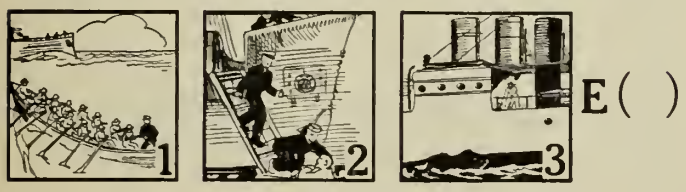

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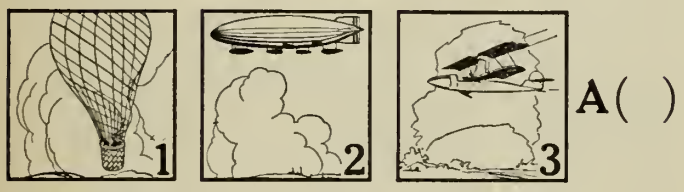

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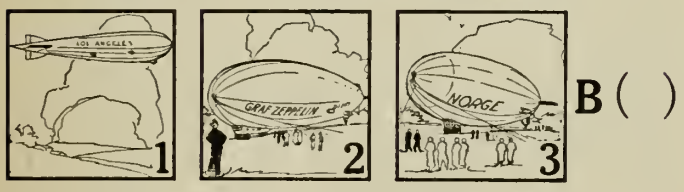

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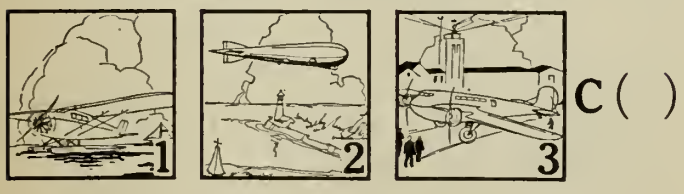

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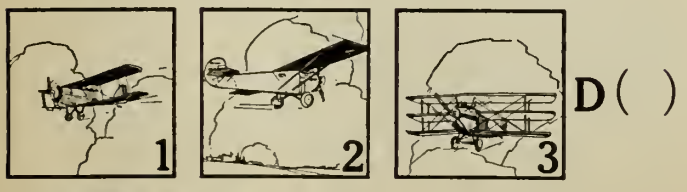

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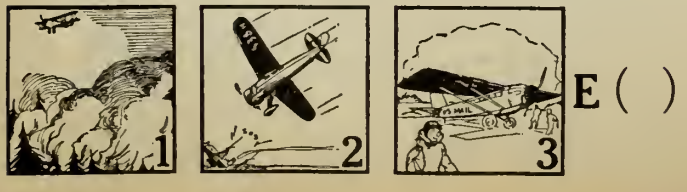

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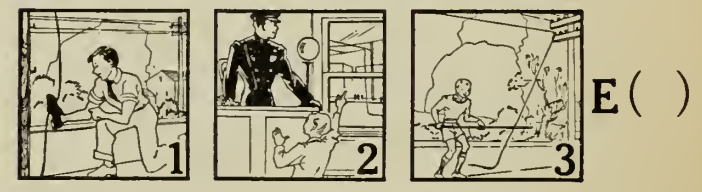

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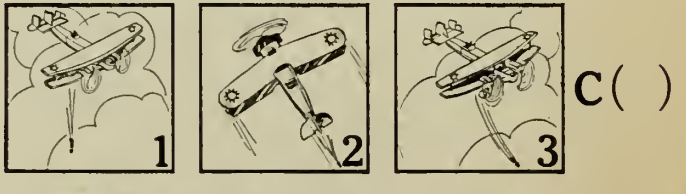

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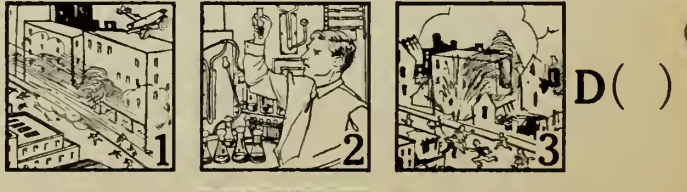

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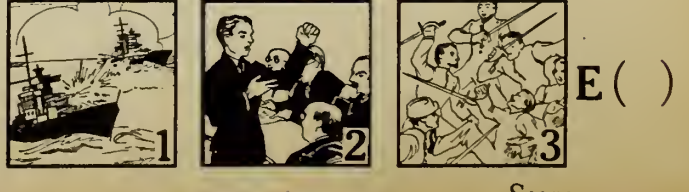

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Score.....

DURRELL-SULLIVAN
READING CAPACITY AND ACHIEVEMENT TESTS

READING ACHIEVEMENT TEST

By Donald D. Durrell
Professor of Education and Director of the Educational Clinic
Boston University

and Helen Blair Sullivan
Associate Director of the Educational Clinic
Boston University

Inter. Achievem't

A

INTERMEDIATE TEST: FORM A

For Grades 3 to 6

Name.....Grade.....Teacher.....Boy or girl.....

Age.....When is your next birthday?.....How old will you be then?.....

Name of school.....City.....Date.....

Test	Score	Grade Equivalent	Age Equivalent
1. Word Meaning			
2. Paragraph Meaning			
Total			
Optional Tests			
3. Spelling			
4. Written Recall Rating			

Patent No. 1,586,628

Published by World Book Company, Yonkers-on-Hudson, New York, and Chicago, Illinois
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DS:RAT:INTER.A-11

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TEST 1. WORD MEANING

Samples.

An *apple* is a kind of — 1 paint 2 metal 3 animal 4 fruit 5 chair . . 1 2 3 4 5

Large means — 1 angry 2 big 3 hurt 4 little 5 like 1 2 3 4 5

To *shut* means to — 1 help 2 give 3 take 4 run 5 close 1 2 3 4 5

---

1. A *dog* is an — 1 answer 2 elephant 3 animal 4 excuse 5 orange 1 2 3 4 5
2. A *robin* is a — 1 crow 2 bird 3 bug 4 flower 5 leaf 1 2 3 4 5
3. To *bring* is to — 1 find 2 carry 3 think 4 lose 5 fall 1 2 3 4 5
4. *Small* means — 1 hurry 2 large 3 little 4 like 5 help 1 2 3 4 5
5. To *fall* is to — 1 pay 2 lift 3 touch 4 drop 5 face 1 2 3 4 5
6. To *bake* is to — 1 break 2 lose 3 cook 4 speak 5 copy 1 2 3 4 5
7. A *dollar* is — 1 copper 2 money 3 business 4 healthy 5 clothing 1 2 3 4 5
8. A *voice* is used to — 1 clamp 2 speak 3 point 4 write 5 mark . . . 1 2 3 4 5
9. A *potato* is a — 1 song 2 planet 3 vegetable 4 table 5 postman . . 1 2 3 4 5
10. *Beef* is a kind of — 1 horse 2 boat 3 maze 4 ranch 5 meat 1 2 3 4 5

2→

11. To *chop* means — 1 roll 2 note 3 come 4 chide 5 cut 1 2 3 4 5
12. If a thing is *above*, it is — 1 glad 2 pleasant 3 short 4 higher 5 between 1 2 3 4 5
13. A thing that is *bent* is — 1 warm 2 sharp 3 crooked 4 straight 5 tight . . . 1 2 3 4 5
14. *Travel* means — 1 trouble 2 journey 3 serious 4 prepare 5 junction . . 1 2 3 4 5
15. *Oil* is used for — 1 fuel 2 water 3 fun 4 writing 5 presents 1 2 3 4 5
16. *Quarrel* means — 1 stop 2 travel 3 fight 4 forget 5 throw 1 2 3 4 5
17. A *hall* is a — 1 horn 2 road 3 tooth 4 room 5 field 1 2 3 4 5
18. An *island* is surrounded by — 1 sugar 2 gardens 3 earth 4 salad 5 water 1 2 3 4 5
19. *Remain* means — 1 ride 2 measure 3 happen 4 stay 5 accompany . . 1 2 3 4 5
20. *Salt* is used on — 1 holidays 2 water 3 food 4 birds 5 flowers . . 1 2 3 4 5
21. *Marriage* means — 1 image 2 civil 3 bitter 4 obtain 5 wedding . . 1 2 3 4 5
22. A *carpenter* makes things of — 1 iron 2 stone 3 cement 4 wood 5 grass 1 2 3 4 5
23. A *maid* is a — 1 smile 2 father 3 girl 4 heart 5 fruit 1 2 3 4 5
24. A *palace* is a — 1 crown 2 storm 3 land 4 building 5 policeman . . 1 2 3 4 5
25. A *helmet* is worn on the — 1 knees 2 breast 3 feet 4 elbows 5 head 1 2 3 4 5

26. When you *miss school*, you are — 1 tardy 2 absent 3 present 4 taught 5 fair
27. A person is *alone* who is without — 1 money 2 food 3 company 4 shelter 5 danger
28. A *stomach* is part of the — 1 sea 2 sky 3 body 4 country 5 world
29. A man's *daughter* is his — 1 parent 2 child 3 sister 4 son 5 niece . . .
30. *Ill* means — 1 sick 2 hungry 3 well 4 safe 5 sorry . . . . . .
31. *Excellent* means very — 1 weak 2 good 3 happy 4 poor 5 tired . .
32. A *hive* is for — 1 oil 2 school 3 robbers 4 peaches 5 bees . . . . .
33. To *tumble* is to — 1 type 2 ask 3 knock 4 fall 5 tickle . . . . . .
34. A *grandparent* is an — 1 antagonist 2 elephant 3 ancestor 4 impostor 5 umpire
35. A *smell* is an — 1 amount 2 answer 3 office 4 odor 5 idea . . . . .
36. An *elm* is a — 1 mold 2 helm 3 bug 4 tree 5 tool . . . . . .
37. A *mule* is a — 1 splinter 2 pearl 3 beast 4 ditch 5 handle . . . . . .
38. *Costly* things are — 1 expensive 2 pliant 3 scorched 4 liberal 5 domestic

3→

39. An *author* is a — 1 patron 2 policeman 3 statesman 4 treasurer 5 writer
40. A *mayor* is an — 1 expert 2 animal 3 invalid 4 umbrella 5 official
41. A *zone* is a — 1 number 2 stepson 3 region 4 sliver 5 habit . . . .
42. To *injure* is to — 1 slump 2 insure 3 wound 4 sell 5 splash . . . .
43. To *rouse* means to — 1 waken 2 rule 3 roast 4 throw 5 love . . .
44. *Mild* means — 1 gentle 2 price 3 wild 4 new 5 behind . . . . . .
45. *Wicked* means — 1 generous 2 grateful 3 unselfish 4 evil 5 brilliant
46. To *make preparations* is to get — 1 over 2 measles 3 ready 4 upon 5 cloudy
47. A *selection* is a — 1 bullet 2 capital 3 desire 4 choice 5 folder . .
48. To *tour* is to — 1 prepare 2 toast 3 lean 4 travel 5 trust . . . . . .
49. *Twinkle* means — 1 wrinkle 2 ringing 3 pitiful 4 glisten 5 feeble . .
50. *Coarse* cloth is — 1 smooth 2 fine 3 rough 4 cold 5 short . . . . . .
51. A *bough* is a — 1 limb 2 leaf 3 pail 4 crest 5 trunk . . . . . .
52. To *welcome* means to — 1 endure 2 persist 3 receive 4 believe 5 practice

53. A *blunt* thing is — 1 dull 2 sharp 3 disagreeable 4 black 5 thin
54. *Circular* means — 1 careless 2 familiar 3 round 4 square 5 jealous
55. *Skillful* means — 1 laborious 2 excited 3 radical 4 expert 5 kindly
56. *Interior* means — 1 inferior 2 above 3 empty 4 dreary 5 inside
57. *Stupid* means — 1 studious 2 false 3 stylish 4 cowardly 5 dull
58. To *surrender* is to — 1 surround 2 soften 3 colonize 4 yield 5 dance
59. *Destruction* causes — 1 discipline 2 ruin 3 government 4 scandal 5 satisfaction
60. To *convince* means to — 1 declare 2 design 3 combine 4 nourish 5 persuade
61. A *sign* is an — 1 offering 2 agreement 3 acquaintance 4 indication 5 address
62. A *portion* is a — 1 gate 2 home 3 wall 4 riddle 5 share
63. To *overcome* is to — 1 discover 2 happen 3 anticipate 4 defeat 5 worry
64. An *insult* is an — 1 instinct 2 insertion 3 announcement 4 embrace 5 offense
65. To *confirm* is to make — 1 angry 2 equal 3 trouble 4 certain 5 time
66. *Valiant* means — 1 valid 2 lenient 3 brave 4 royal 5 loyal

4➡

67. To *kindle* means to — 1 pick 2 range 3 light 4 soil 5 assist
68. *Abrupt* means — 1 exclude 2 neutral 3 recent 4 sudden 5 rugged
69. *Fatigue* means — 1 fatal 2 faithful 3 conflict 4 dodge 5 weariness
70. A *durable* thing is — 1 fantastic 2 courteous 3 modified 4 lasting 5 moist
71. *Fourscore* is the same as — 1 fourteen 2 fortnight 3 eighty 4 twenty 5 four
72. To *ratify* is to — 1 confuse 2 approve 3 assist 4 report 5 poison
73. To *rebel* is to — 1 realize 2 pledge 3 justify 4 resist 5 flourish
74. *Sullen* means — 1 sultry 2 satisfied 3 credulous 4 harmful 5 surly
75. *Probability* means — 1 disheveled 2 originality 3 likelihood 4 sincerity 5 enthusiasm

Score.....

TEST 2. PARAGRAPH MEANING

Sample.

One warm, sunny day Helen and her brother went on a trip to the beach. Their mother and aunt went with them. They took their bathing suits so that they could all go into the water. When noontime came, they had lunch on the sand. After lunch the children gathered sea shells. They saw a starfish and some funny little crabs.

A. What did Helen and her brother do?
1 went to see their aunt 2 went to the seashore 3 went on a train
4 went for crabs 5 went fishing 1 2 3 4 5

B. The weather was —
1 quiet 2 funny 3 fair 4 gloomy 5 rainy 1 2 3 4 5

C. The best name for this story is —
1 Helen and Her Aunt 2 Gathering Shells 3 Eating Lunch Outdoors
4 One Warm Day 5 A Trip to the Beach 1 2 3 4 5

I

5→

Mary and John go to camp as soon as school closes in the summer. They go on the train and stay until it is time for school to open again in the fall. They have a happy time at camp because there are many other boys and girls there too. They ride, swim, and play games together every day.

1. When do Mary and John go to camp?
1 before school 2 when school is over 3 in the fall 4 when school starts
5 every day 1 2 3 4 5

2. Which word tells what kind of a time the children have at camp?
1 lonesome 2 sad 3 joyous 4 funny 5 weary 1 2 3 4 5

3. How do the children travel to camp?
1 on a train 2 on a bus 3 in an automobile 4 on a car 5 in an airplane .. 1 2 3 4 5

4. The best name for this story would be —
1 Close of School 2 Playing Games 3 A Trip on the Train
4 A Summer at Camp 5 The Boys at Camp 1 2 3 4 5

5. Mary and John enjoy camp life because they —
1 are glad to be away for the summer 2 like the ride on the train
3 are glad to be out of school 4 like to study nature
5 have fun playing games with the other children 1 2 3 4 5

II

Jack had a new fish line. His father took him fishing in a little brook at the back of his grandfather's house. Jack was the first to feel a bite. There was a strong pull at his line. He tried hard to pull the fish out of the water, but it pulled so hard his father had to help him. He was happy when he saw his fish lying on the grass near the stream.

6. Jack went —
   1 to his grandfather's house 2 into the water 3 fishing with his father
   4 to buy a fish line 5 to the ocean to fish 1 2 3 4 5

7. The fish —
   1 helped 2 struggled 3 ate 4 tried 5 fell 1 2 3 4 5

8. Jack tried to —
   1 fish near the stream 2 pull his father back 3 land his own fish
   4 put fish in the brook 5 lie on the grass 1 2 3 4 5

9. The best name for this story is —
   1 A Trip to Grandfather's 2 Catching Some Fish 3 Jack's Fishing Trip
   4 Buying a New Fish Line 5 How Father Fished 1 2 3 4 5

10. Jack enjoyed his trip because —
    1 the fish got away 2 the brook was near grandfather's 3 he caught a fine fish
    4 he went to a stream 5 his father helped him 1 2 3 4 5

6→

III

In the cold northlands many animals go to sleep for the whole winter. They have to store up enough fat on their bodies in the summertime to last them all winter while they are sleeping. These animals grow huge in the summer. Bears, which are among the animals which sleep all winter, get so large in the summer that they can hardly move about. All these animals which sleep during the winter crawl into caves or hollow trees when winter nears and stay until spring comes once more. When they come out, they are very thin and are starving.

11. How do the animals which sleep through the winter get their winter food?
    1 by carrying their food in with them 2 by getting fat in summer
    3 by coming out for food as they need it 4 by eating the bark of trees
    5 by living on small animals 1 2 3 4 5

12. The climate where these animals live is very —
    1 windy 2 warm 3 breezy 4 cold 5 hot 1 2 3 4 5

13. How do the animals look when they come out of the cave?
    1 huge and fat 2 lean and hungry 3 thin and tired 4 large and strong
    5 huge and starving 1 2 3 4 5

14. The best title for this story would be —
    1 Bears Which Go into Caves 2 Thin and Hungry Animals
    3 Animals Which Sleep through the Winter 4 Large Animals Sleep in Winter
    5 While They Are Sleeping 1 2 3 4 5

15. The animals which sleep through the winter make winter dens —
    1 in the summertime 2 in the open woods 3 when spring comes
    4 in caverns or hollow logs 5 while they are sleeping 1 2 3 4 5

IV

The St. Bernards are among the bravest of dogs. They are large and very strong. In Switzerland these dogs are trained to go out and find travelers who are lost in the snowdrifts on the high mountains. A first-aid kit containing food and medicine is hung about their necks, and a warm blanket is strapped on their backs. When they find worn-out travelers, they dig them out of the snow and help them if they are awake and able to move. If the traveler is injured and helpless, the dog is trained to go back to the town below and bring aid. Many lives are saved every year by these fearless animals.

16. What is the most valuable thing that St. Bernard dogs do?
1 They can climb over snowdrifts. 2 They are good mountain climbers.
3 They are trained to rescue lost travelers. 4 They are large and strong.
5 They carry first-aid kits. 1 2 3 4 5

17. The St. Bernard dog is —
1 cowardly 2 speedy 3 courageous 4 rough 5 fierce 1 2 3 4 5

18. How does the dog assist worn-out travelers?
1 by digging large holes in the snow 2 by climbing the drifts to the traveler
3 by bringing first aid 4 by covering him with a blanket 5 by his great strength 1 2 3 4 5

19. The best title for this story is —
1 Training Dogs 2 The Heroic St. Bernard 3 A Strange St. Bernard Dog
4 People Lost in Mountains 5 Traveling through Snowdrifts 1 2 3 4 5

20. What do the dogs do for the travelers they cannot help? 1 stand the man on his feet
2 give him food and medicine 3 return to the village for aid
4 carry him down the mountain 5 give him the first-aid kit 1 2 3 4 5

V

7→

The camel possesses a most uncommon body, which almost seems made to order for the many purposes he fills in the life of the desert people. His mouth is peculiarly fitted for securing food. The strong membrane and powerful teeth enable him to tear off the dry shrubs and stiff, prickly cactus of the desert. His huge nostrils allow him to breathe deeply. They close tightly when a sandstorm arises, thus shutting out the choking sands. His hump, a mere lump of fat, is of great use if food fails, for he can obtain nourishment from it for many days. He is also provided with inside reservoirs which hold enough water to last him for four or five days. Unfortunately the camel is dull. To kneel down at a given signal is about the only trick he ever learns. Although the camel is homely he is nevertheless valuable, for without him many portions of the earth would remain untraveled.

21. The camel is — 1 more intelligent than the horse 2 capable of learning a great deal
3 rather unintelligent 4 poorly taught 5 friendly and intelligent 1 2 3 4 5

22. The body of the camel is —
1 unfortunate 2 unusual 3 graceful 4 evil 5 inspiring 1 2 3 4 5

23. The mouth of the camel — 1 is harmed by thorny cactus 2 is small and tough
3 is well suited for procuring food 4 tightens when a sandstorm arises
5 provides an inside reservoir 1 2 3 4 5

24. The best title for this story is — 1 The Body of the Camel
2 The Usefulness of the Camel 3 The Stupidity of the Camel
4 Sandstorms on the Desert 5 How the Camel Eats 1 2 3 4 5

25. The camel is — 1 unsuited for desert travel 2 helpless in a sandstorm
3 a tricky animal 4 well adapted for desert travel 5 friendly and intelligent ... 1 2 3 4 5

VI

Bill vaulted the fence into the corral and faced the bucking pony. At his approach the little animal struck out with his forefeet, but Bill was quick and avoided him. The boy caught the pony close to the head and with a rapid movement sprang into the stirrups. Then began the real task. With head down, back up, and whinnying loudly, the animal reared into the air, bouncing back to earth with terrific force. He tried every trick possible to throw his rider, plunging and rearing in all directions, but Bill held on. Finally, after many minutes, the exhausted pony, wet with perspiration, stood still. His nostrils trembled, but one felt that though his body had been subdued, his spirit was still unbroken.

26. When Bill approached, the pony was — 1 tired and broken 2 quieted in spirit 3 impatient to be ridden 4 disturbed and angry 5 thrown to the ground 1 2 3 4 5

27. The pony was finally — 1 overbalanced 2 exultant 3 overpowered 4 distracted 5 restored 1 2 3 4 5

28. The little pony tried to — 1 outlive his rider 2 aid the boy 3 unseat his rider 4 exhaust the animal 5 butt Bill 1 2 3 4 5

29. The best title for this story is — 1 Riding the Range 2 An Exhausted Pony 3 Breaking a Pony 4 A Perspiring Pony 5 Bill Approached a Pony 1 2 3 4 5

30. The article illustrates — 1 how to enter a corral 2 a whinnying pony 3 trickery in riding 4 leading a pony 5 skill in horsemanship 1 2 3 4 5

VII

8→

Studying bird life with a camera is certainly an entrancing sport. One can engage in it without destroying life, yet get great satisfaction from the thrilling activities it offers. The sport is appropriate for any time or place. From it one can derive all sorts of adventures, for to be a good photographer of birds in their native haunts it is necessary to climb trees and cliffs as well as travel on land and water. How interesting it is to find their nests, learn where they stay at various times during the day, how the young are fed and cared for, and procure photographs of the birds in various attitudes. Hiking with the camera through the woods is always an enjoyment. There is a feeling of excitement and expectancy present, for one never knows at what moment he may come upon some unusual bird activity.

31. Making studies of bird life is interesting because — 1 they haunt native places 2 of the various activities one can observe 3 it is always done on water 4 the young are fed and cared for 5 the sport is appropriate 1 2 3 4 5

32. Using a camera in place of a rifle encourages wild life by promoting — 1 destruction 2 conservation 3 dissatisfaction 4 conversation 5 haunts 1 2 3 4 5

33. Bird study is a satisfying sport because — 1 the young are fed 2 the birds like it 3 one can get eggs out of nests 4 it can be enjoyed during all seasons 5 one can use a rifle 1 2 3 4 5

34. The best title for this story is — 1 Interesting Birds 2 The Excitement of Adventure 3 Taming Wild Birds 4 Photography of Wild Birds 5 Destroying Bird Life 1 2 3 4 5

35. Taking pictures of bird life is fascinating because — 1 it is helped by a camera 2 it takes much time 3 it gives more bird pictures 4 it brings adventure without destruction of life 5 it scatters the birds about 1 2 3 4 5

VIII

In the part of our country which gets very little rain in the summer the ground must be wet by irrigation to make the plants grow. Otherwise all the crops would be spoiled by dry weather. This form of agriculture is carried on in states where snow is found high up in the mountains the entire year. A large reservoir is made by damming up the mountain streams. The snow, melting in summer, rushes into a stream. This, in turn, is joined to a large ditch. At the head of the ditch is an intake gate. This can be opened and closed at will. In this way water is drawn off and the various fields are irrigated. The water can be turned on whenever the fields need it. The parts of our country where irrigation is possible seldom have crop failures, because water can be secured when it is needed.

36. This form of agriculture is carried on where —
1 crops are grown in summer 2 mountain streams make it possible
3 cities are near 4 there are large reservoirs 5 there are crop failures 1 2 3 4 5

37. Because irrigation is possible crop failures are —
1 increased 2 reduced 3 possible 4 permitted 5 eliminated 1 2 3 4 5

38. They stop the water from flooding the fields by —
1 damming the ditch 2 use of gates 3 opening the reservoir
4 irrigating the fields 5 drawing off the water 1 2 3 4 5

39. The best title for this story would be —
1 Damming Up Streams 2 Supplying Water for Irrigation
3 Crops in Dry Weather 4 Building Huge Dams 5 Supplying Water for Colorado 1 2 3 4 5

40. Land that is irrigated yields better harvests because —
1 in summer it gets little rain 2 it is high up in the mountains
3 water may be applied as needed 4 the water can be turned off
5 agriculture is carried on 1 2 3 4 5

IX

9→

Sugar beets must be raised where cheap labor can be secured because the plants require a great deal of cultivation, most of which must be done by hand. First the plants are thinned and then blocked to get the correct number in the rows. The roots from which the sugar is extracted are not like the red beets which are eaten as vegetables, but are more like the common turnips. These roots are washed, sliced, and soaked in water. The water is later drawn off and boiled into beet syrup. Then the syrup is changed to a brown sugar called raw sugar. The last step is to send the raw sugar through the refinery, where it is cleaned and whitened. Then the white sugar is ready to be boxed and sold for use in our homes.

41. Sugar beets must be raised where labor is not expensive because they require —
1 much care 2 much washing 3 many plants in a row 4 soaking in water
5 much boiling 1 2 3 4 5

42. What kind of labor is most used in the raising of sugar beets ?
1 machine 2 manual 3 difficult 4 easy 5 unusual 1 2 3 4 5

43. The raw sugar is — 1 made into syrup 2 refined and whitened
3 boxed and sold 4 left as it is 5 changed to brown sugar 1 2 3 4 5

44. The best title for this story is — 1 Blocking and Thinning Beets
2 Colorado Sugar Beets 3 How Beet Sugar Is Obtained
4 Cleaning Raw Sugar 5 How Beet Sugar Is Whitened 1 2 3 4 5

45. Raising sugar beets requires — 1 inexpensive labor 2 syrup changed to sugar
3 sugar to be cleaned 4 many common turnips 5 raw sugar 1 2 3 4 5

X

Airplanes are growing more important every year. Today they have traveled to almost every part of the world and into many places that would otherwise have remained unexplored. Daring pilots have been responsible for many outstanding feats. They have gone to the aid of dying men when there was no other opportunity of reaching them. At one time serum was carried to Alaska by plane and saved the lives of many children who were seriously ill of diphtheria. Every day of the year, and in all kinds of weather, Uncle Sam's pilots carry the mail through the air. Practically every day one reads of some new achievements of airplanes.

46. Airplanes have rendered valuable service to humanity by — 1 carrying many diseases 2 having no other opportunity 3 aiding the sick and dying 4 helping boys to become pilots 5 taking passengers in the air 1 2 3 4 5

47. The life of an airplane pilot is — 1 lonesome 2 easy 3 hazardous 4 happy 5 high 1 2 3 4 5

48. Airplanes are used for a variety of services such as — 1 exploring, carrying mail, and aiding the sick 2 carrying mail in all sorts of weather 3 bringing serum to diphtheria patients 4 serving humanity 5 traveling in all kinds of weather 1 2 3 4 5

49. The best title for this story is — 1 Mail Pilots 2 Exploring with Airplanes 3 Value of Airplanes 4 Life of an Air Pilot 5 A Trip to Alaska 1 2 3 4 5

50. The accomplishments of airplanes are — 1 unimportant 2 understanding 3 trivial 4 significant 5 serious 1 2 3 4 5

XI

10→

The mode of living on the plantations of the South was vastly different from that of the early New England people. The spacious Southern mansions, surrounded by the many slave cabins, gardens, and poultry yards, were often in themselves small villages. While many of these planters were living in wasteful extravagance, the Puritans of New England were living in modest two-room homes. They were thrifty people who were not in favor of the riotous living and entertaining of the planters. The New England people were more interested in the establishment of good common schools for all people, while the rich planters did not favor this idea. They had tutors at home for their children, or sent them to Europe to be educated.

51. The New Englanders were interested in — 1 having tutors for their sons 2 organizing good public schools 3 educating their children in England 4 living in two rooms 5 riotous living and entertaining 1 2 3 4 5

52. Which word best describes a Southern planter? 1 lavish 2 gallant 3 brave 4 weak 5 frugal 1 2 3 4 5

53. Which word best describes a New England home? 1 magnificent 2 insignificant 3 unpretentious 4 extensive 5 valuable 1 2 3 4 5

54. The best title for this story is — 1 A Story of Education 2 A Comparison of the Life of the Planters 3 Northern and Southern Modes of Living 4 The Thrifty New England People 5 Good Schools for All 1 2 3 4 5

55. The Southern gentlemen desired — 1 common education for all 2 the organizing of good public schools 3 good education for members of his own family 4 tutors for children in New England 5 good free schools for planters' sons 1 2 3 4 5

XII

The pulmotor, a device for the resuscitation of persons suffering from gas poisoning, drowning, or electric shock, consists of a tank of compressed oxygen which is thinned with air and pumped into the lungs of the patient. It must be remembered that if breathing is to be produced artificially the process must be begun within ten minutes after the breathing has stopped or the person may not revive. Therefore it is not safe to wait to begin to revive the person until the pulmotor arrives. Some other method of restoring consciousness should be attempted in order to avoid a fatality. While the pulmotor can be of great advantage, it is also a very dangerous instrument in the hands of an inexperienced person. There is great peril, if the instrument is not properly handled, of drawing the air out of the small air cells in the lungs and collapsing them.

11→

56. The pulmotor is an instrument for —

1 collapsing the lungs 2 avoiding drowning 3 inducing artificial respiration 4 administering electric shock 5 inducing carbon monoxide 1 2 3 4 5

57. What is conveyed to the patient by means of the pulmotor?

1 concentrated oxygen 2 a device of great advantage 3 air cells which collapse 4 a mixture of oxygen diluted with air 5 a combination of oxygen and nitrogen ... 1 2 3 4 5

58. If the person is to be resuscitated, artificial respiration should be started —

1 by a dangerous instrument 2 for collapsing the lungs 3 within ten minutes 4 by a tank of oxygen 5 by an inexperienced person 1 2 3 4 5

59. While waiting for the pulmotor one should —

1 attempt to avoid the instrument 2 apply another type of resuscitation 3 pump oxygen from a tank 4 draw air out of the lungs 5 dilute the air 1 2 3 4 5

60. The pulmotor is a menace in the hands of a novice because —

1 of the danger of injuring the stomach 2 it might not arrive on time 3 it can be of great advantage 4 it should be properly handled 5 of the danger of collapsing the lungs 1 2 3 4 5

Score.....

TEST 4. WRITTEN RECALL

I

Blackie was a little kitten. One day a big dog chased him. He became frightened and ran up a tree. After he got high up in the branches, he was afraid to come down. The little girl who owned him came and stood beneath the tree. She called to Blackie and showed him his dish of milk, hoping he would want his supper enough to try to come down. But he would not come. Finally her father called the fire chief. He sent a fireman with a ladder. The man went up the tree and carried little Blackie down. The little girl was happy to have her kitten again.

II

John could hardly wait, so anxious was he to try the new canoe he had received for his birthday. As soon as he finished his breakfast he raced with his brother and sister to the lake. Here they examined his splendid new gift. John's father showed him how to use the paddle and told him that he might take his brother and sister for a short ride in the canoe, but warned him that he must not go too far from shore before he was thoroughly familiar with handling the new craft. All went smoothly, and gradually John forgot his caution and drifted farther from shore. Suddenly there came a great gust of wind. In a moment the lake was filled with heavy waves. John struggled to keep the little canoe upright. Luckily they were not far from a small island. He steered for this and reached the shore just as a particularly large wave turned the canoe bottom side up. The three children scrambled from the water out onto the island just as another huge wave came in. The canoe floated away, and John feared he had lost his precious gift. But a party in a little steamer presently came to the aid of the stranded children and rescued the canoe, which had blown a distance away.

Primary
Grades 1-3

CALIFORNIA TEST OF MENTAL MATURITY—PRIMARY SERIES

Devised by Elizabeth T. Sullivan, Willis W. Clark, and Ernest W. Tiegs

Name..... Grade..... Boy-Girl

School..... Age..... Last Birthday.....

Teacher..... Date.....

TEST FACTOR	Possible Score	Pupil's Score	Low	Average	High
1. Visual Acuity	10		0–6	7–10	
2. Auditory Acuity	10		0–7	8–10	
3. Motor Co-ordination	20		0–5	6–20	

DIAGNOSTIC PROFILE
(Chart Pupil's Scores Here)

TEST FACTOR	Possible Score	Pupil's Score	Mo. Yr.
A. Memory	32		
4. Immediate Recall*	20		
5. Delayed Recall	12		
B. Spacial Relationships	32		
6. Sensing Right and Left*	10		
7. Manipulation of Areas*	12		
8. Foresight in Spacial Sit'ns*	10		
C. Reasoning	72		
9. Opposites*	12		
10. Similarities*	12		
11. Analogies*	12		
12. Number Concepts*	12		
13. Numerical Quantity	12		
14. Inference	12		
D. 15. Vocabulary	28		
E. Total Mental Factors (A+B+C+D)	164		
F. Language Factors (5+13+14+15)	64		
G. Non-Language Factors (E—F)	100		
H. Chronological Age			
I. Actual Grade Placement (Grade pupil is in)			

Mental Age: 48 60 72 84 96 108 120 132 144 156 168

Yr.: 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0

Mo.: 48 60 72 84 96 108 120 132 144 156 168

*Non-Language tests.

SUMMARY OF DATA

	Score	M. A. ÷ C. A. = I. Q.
E. Total Mental Factors		
F. Language Factors		
G. Non-Language Factors		

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Published by California Test Bureau
3636 Beverly Boulevard, Los Angeles, California

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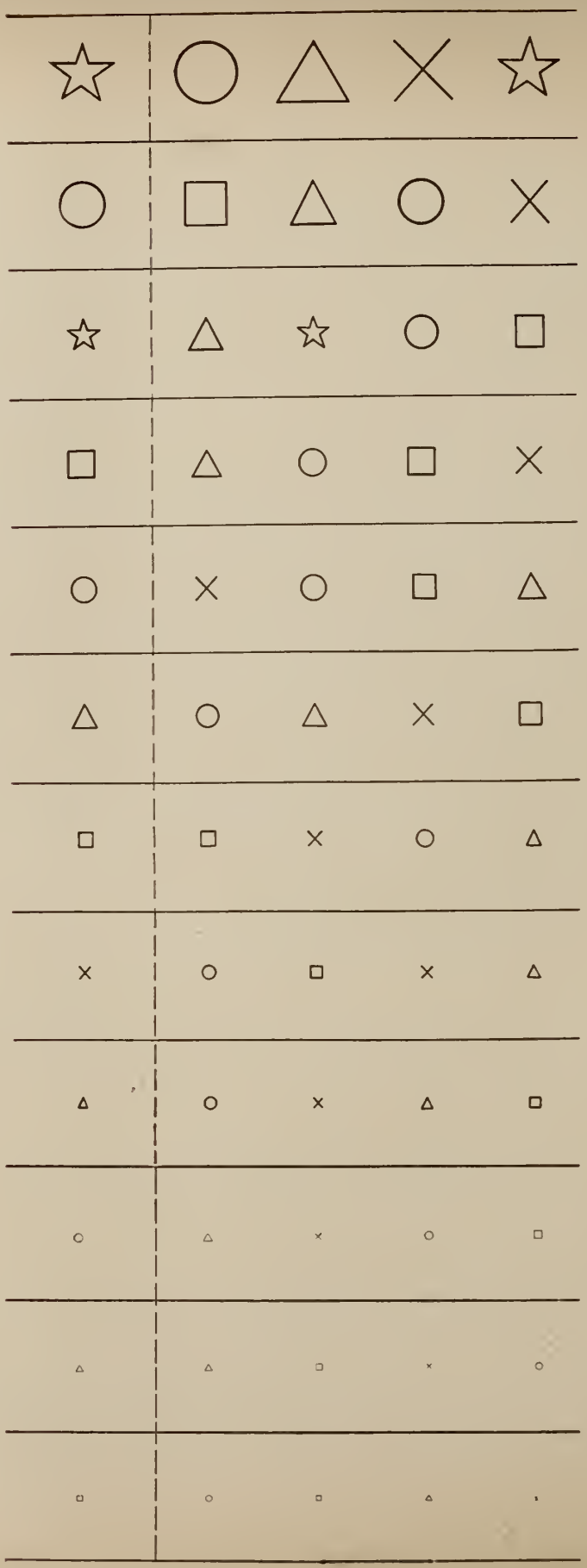

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TEST 2.

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Test 2. Score (number right).....

TEST 3.

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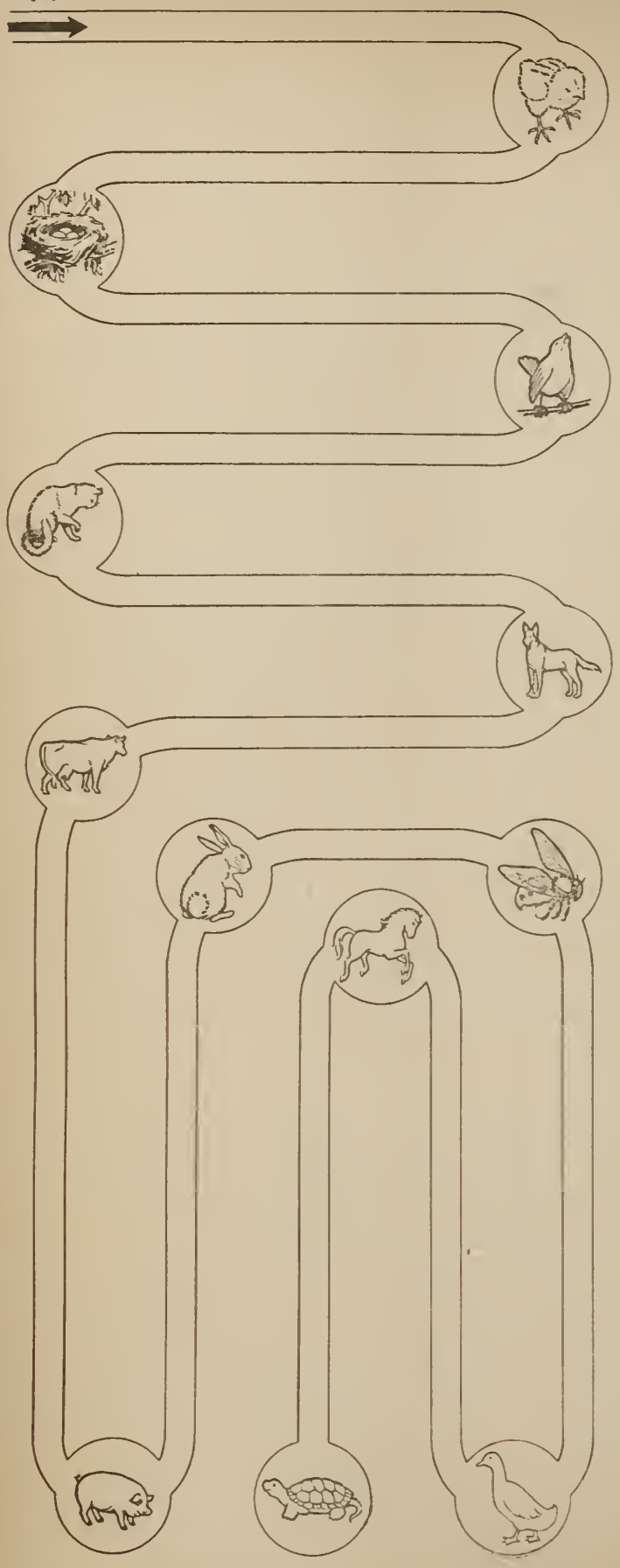

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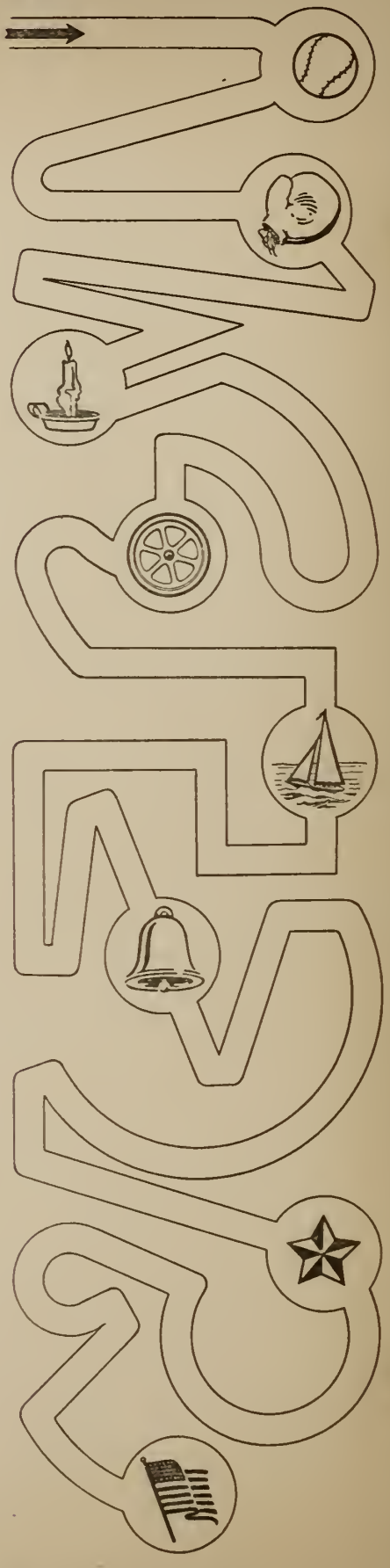

Test 3. Score A( ) + B( )

TEST 4.

A

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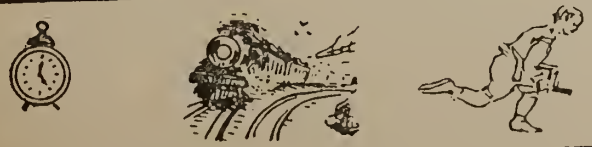
8 

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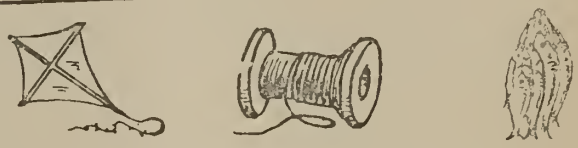
12 

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(1) (2) (3)

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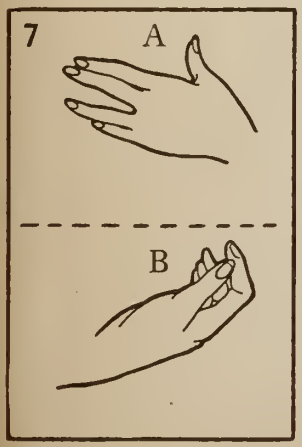

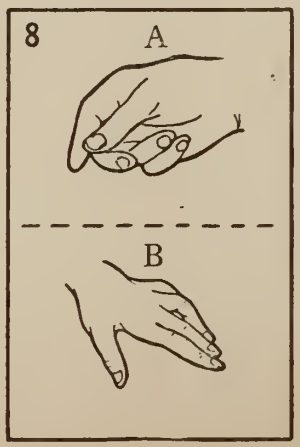

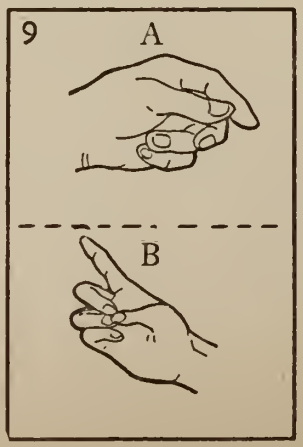

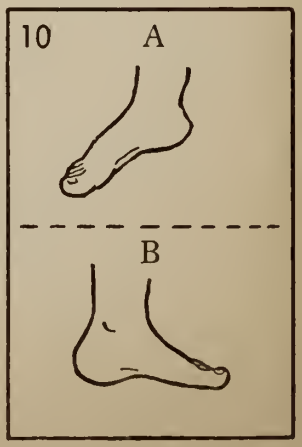

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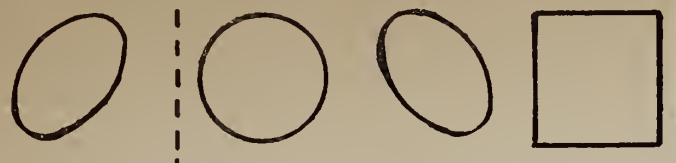
A 

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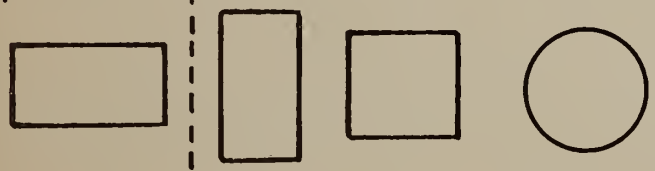
1 

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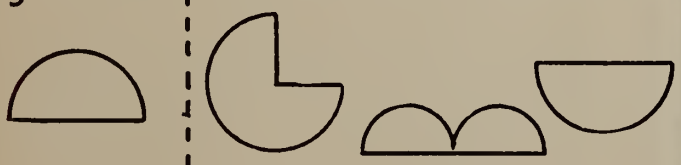
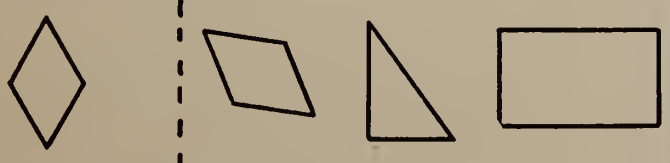
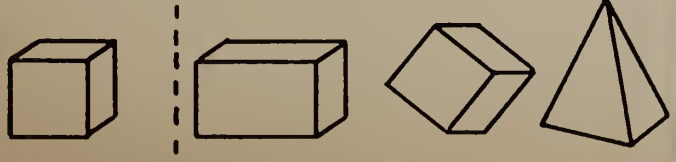
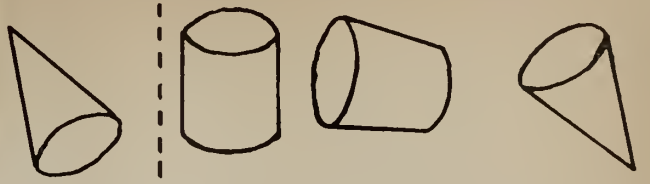
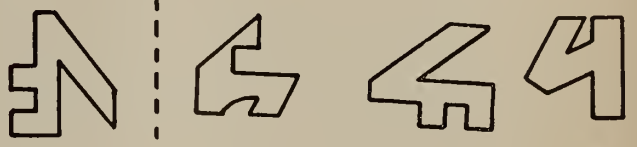
3 

4 

5 

6 

7 

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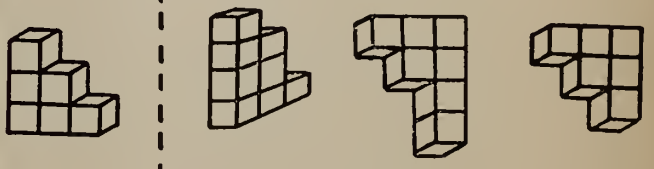
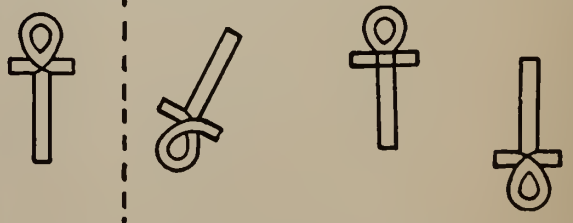
10 

11 

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(1) (2) (3)

Test 7. Score (number right).....

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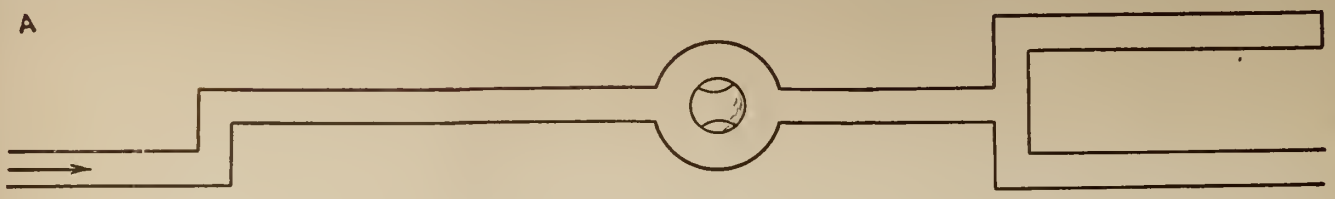

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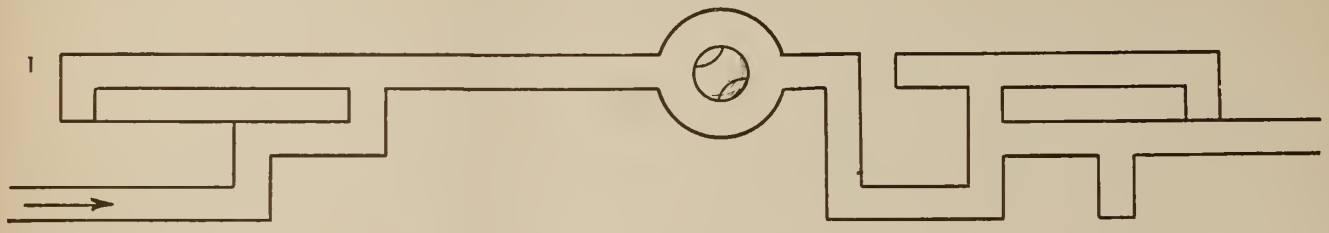

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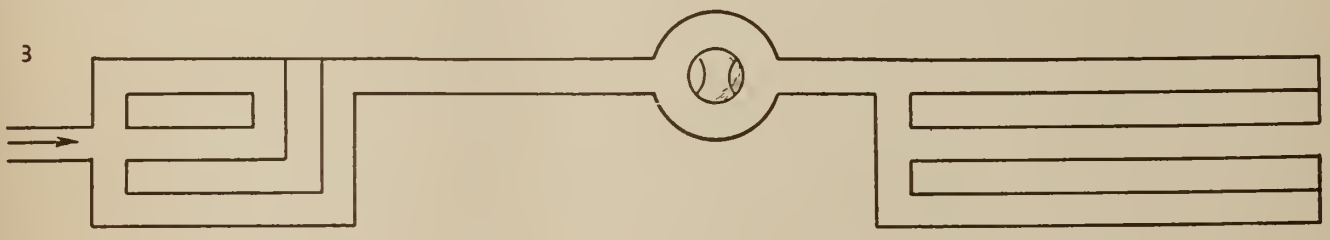

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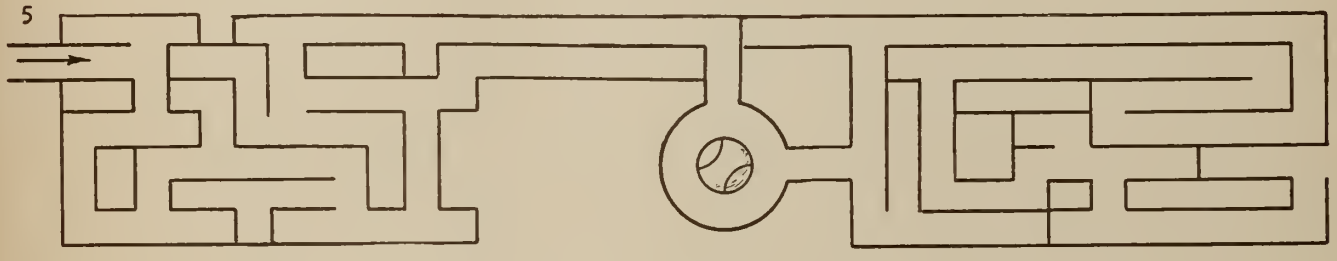

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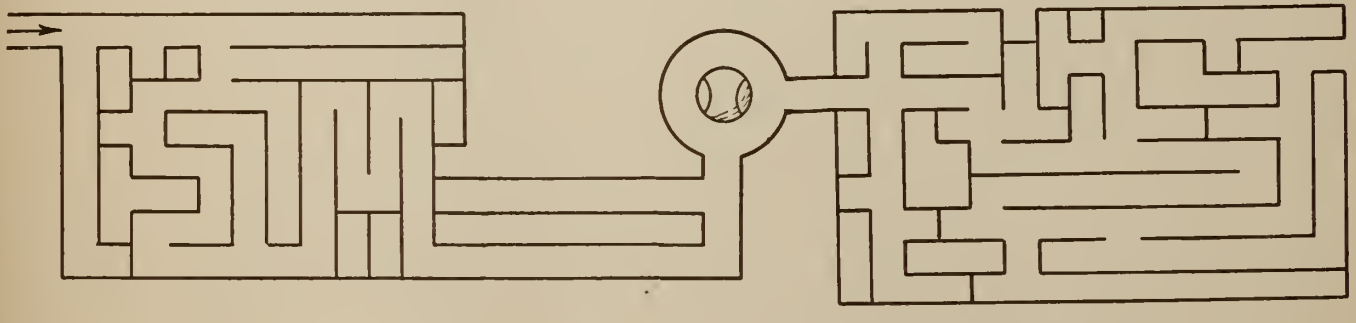

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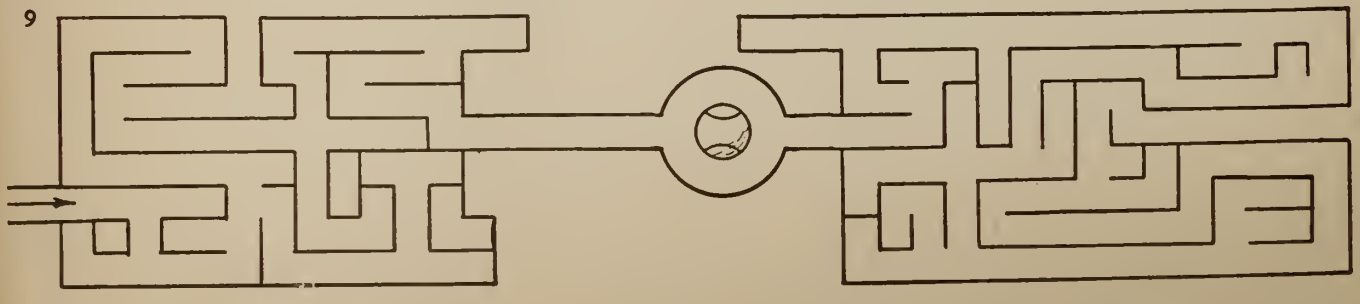

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Test 8. Score (number right).....

TEST 9.

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(1) (2) (3)

(1) (2) (3)

Test 9. Score (number right).....

TEST 10.

Test 10. Score (number right).....

TEST 11.

Test 11. Score (number right).....

TEST 12.

A

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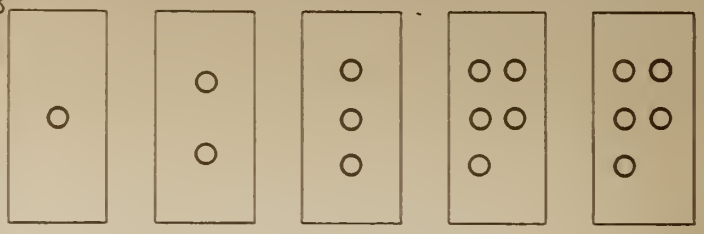
(1) (2) (3)

B



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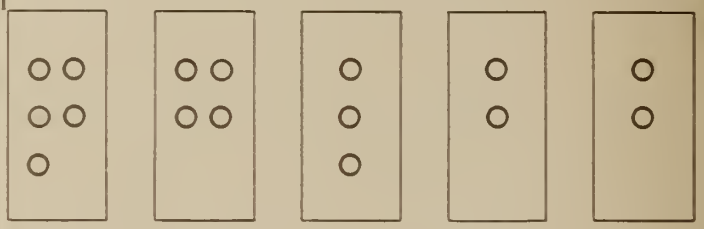

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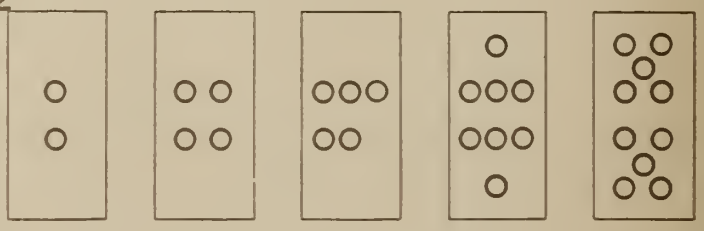

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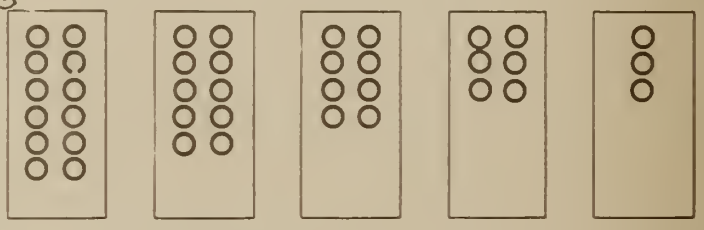

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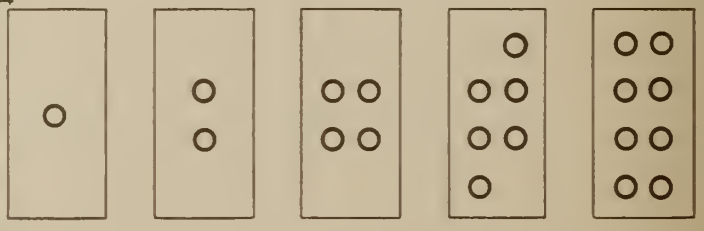

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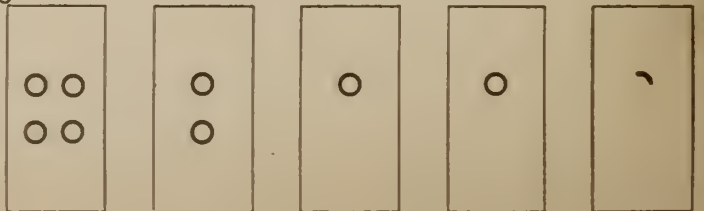

(1) (2) (3) (4) (5)

Test 12. Score (number right).....

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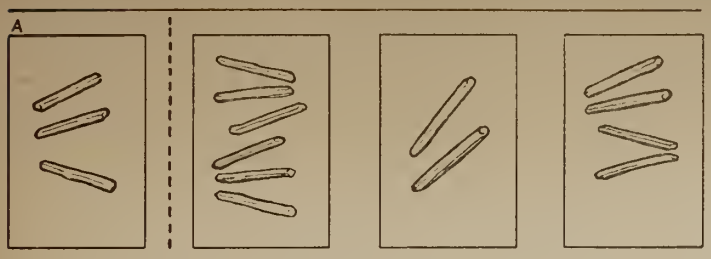

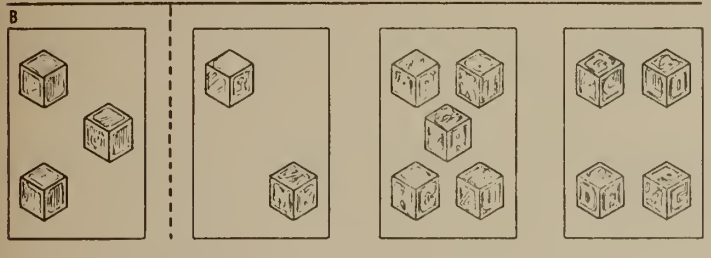

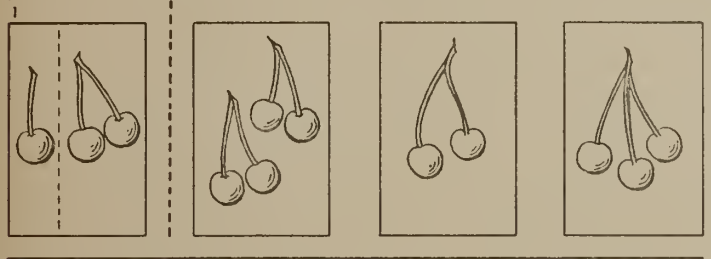

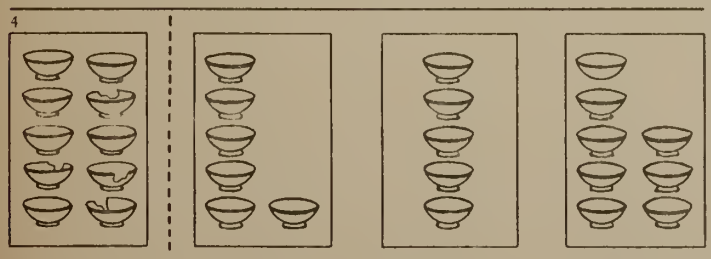

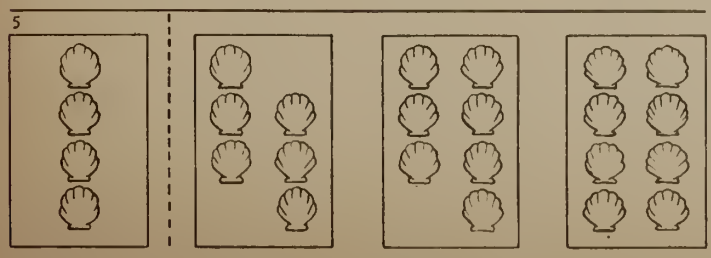

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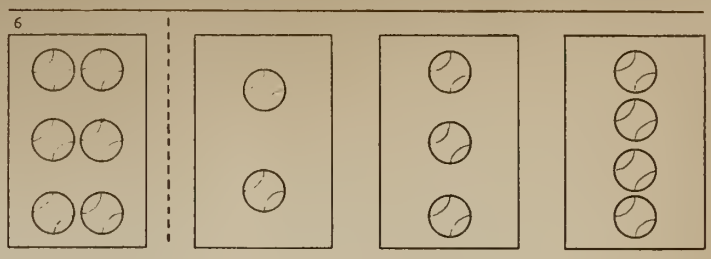
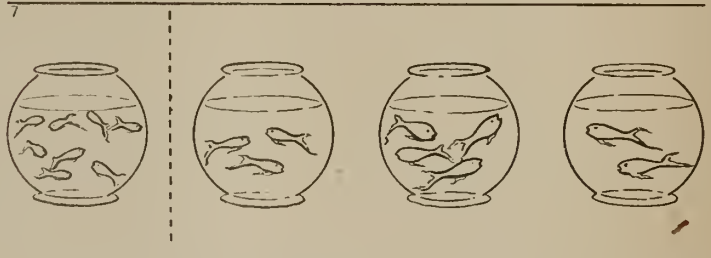
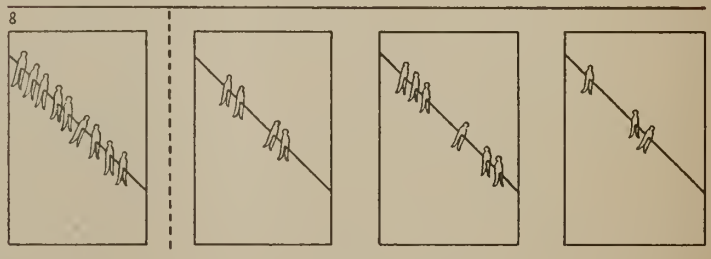
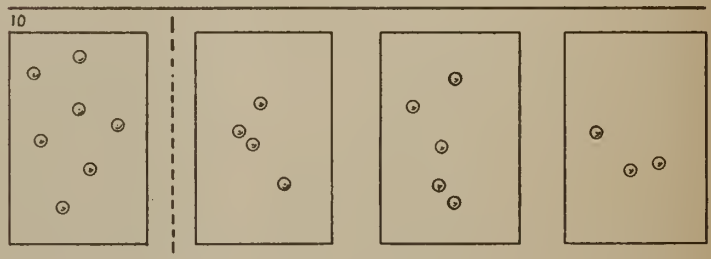
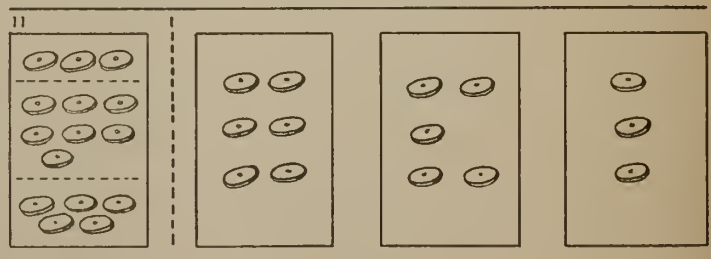










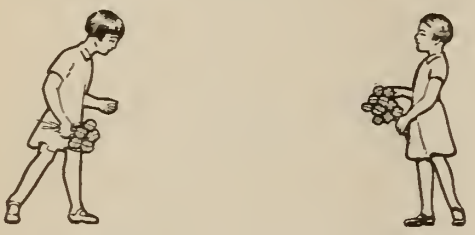
(1) (2) (3)

Test 13. Score (number right).....

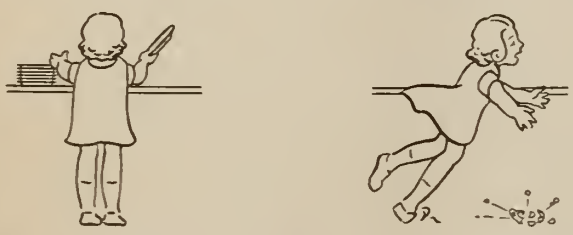
TEST 14.

A

B



1



2

3

4

5

(1) (2) (3)

6

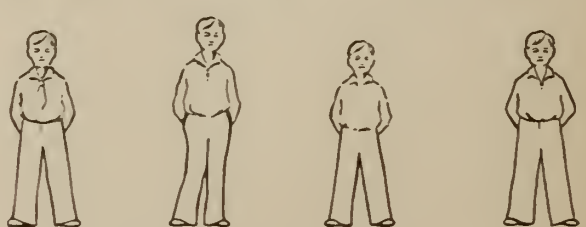
7

8

9

10

11



12

(1) (2) (3)

Test 14. Score (number right).....

TEST 15.

A

B

1

2

3

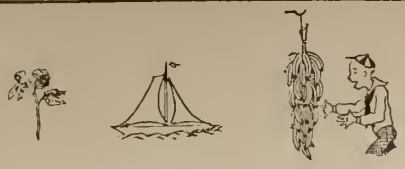
4

5

6

7

8

9 

10

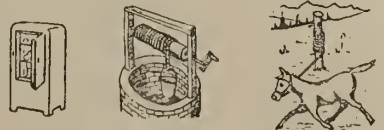
11

12

13

14

15

16 

17

18

19

20

21

22

23

24

25

26

27

28

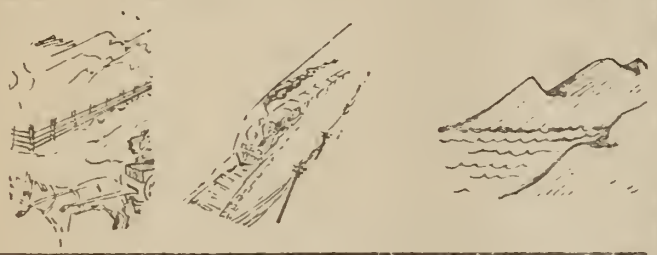
(1) (2) (3) (1) (2) (3) (1) (2) (3)

Test 15. Score (number right).....

TEST 5.

A

B

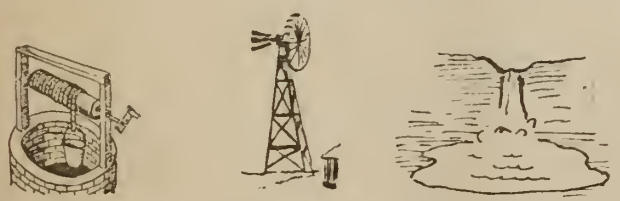


1

2

3

4



5

(1) (2) (3)

6

7

8

9

10

11

12

(1) (2) (3)

Test 5. Score (number right).....

PINTNER GENERAL ABILITY TESTS: VERBAL SERIES

Pintner-Durost Elementary Test

By Rudolf Pintner, Ph.D.
Professor of Educational Psychology, Teachers College, Columbia University

and Walter N. Durost, Ph.D.
Formerly Research Associate, Institute of School Experimentation
Teachers College, Columbia University

A

Reading

INDIVIDUAL PROFILE CHART

Standard Score	TEST 1	2	3	4	5	6	Median Standard Score
180							
170							
160							
150							
140							
130							
120							
110							
100							
90							
80							
70							
60							
Scores →							

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VOCABULARY

In each line pick out the word which means the same as the first word.

A. big —	small ◯	large ◯	rig ◯
B. puppy —	happy ◯	cat ◯	dog ◯

---

1. tiny —	wide ◯	small ◯	tired ◯
2. bright —	knot ◯	yellow ◯	shiny ◯
3. sad —	glad ◯	said ◯	sorry ◯
4. neat —	clean ◯ +	free ◯ +	warmth ◯
5. yell —	scream ◯	murmur ◯	whine ◯
6. bundle —	cake ◯	package ◯	laundry ◯
7. parrot —	bird ◯	vegetable ◯	fish ◯
8. dangerous —	secure ◯	thin ◯	unsafe ◯
9. near —	far ◯	close ◯	neat ◯
10. smart —	teacher ◯	clever ◯	smash ◯
11. leap —	jump ◯	toss ◯	crawl ◯

12. journey — paper ○ satchel ○ trip ○

13. quiet — rough ○ quite ○ still ○

14. pamphlet — read ○ booklet ○ paper ○

15. punch — punish ○ hit ○ pull ○

16. silly — stupid ○ hilly ○ bad ○

17. queer — queen ○ odd ○ cruel ○

18. tidy — neat ○ late ○ cluttered ○

19. certainly — surely ○ doubtful ○ willingly ○

20. courageous — unselfish ○ cheerful ○ brave ○

21. evil — good ○ anvil ○ bad ○

22. order — soldier ○ command ○ obey ○

23. aid — drink ○ health ○ help ○

24. accept — take ○ reject ○ excuse ○

25. commence — school ○ begin ○ commerce ○

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stan. score	*77*	*85*	*90*	*95*	*99*	*103*	*106*	*109*	*111*	*114*	*116*	*118*	*120*	*122*	*124*	*126*	*128*	*131*

Raw score	19	20	21	22	23	24	25
Stan. score	*134*	*137*	*142*	*147*	*152*	*161*	*175*

NUMBER SEQUENCE

In each row the numbers at the left have been arranged in a certain order. Decide which number should come next. Find that number at the right and mark it.

A. 7 8 9 10 11 —	14 ○	6 ○	12 ○	11 ○
B. 0 0 1 1 2 2 3 —	4 ○	2 ○	1 ○	3 ○

---

1. 5 10 15 20 —	25 ○	22 ○	18 ○	30 ○
2. 4 4 5 5 6 6 7 —	7 ○	8 ○	6 ○	5 ○
3. 0 0 1 1 2 2 3 3 —	4 ○	3 ○	2 ○	5 ○
4. 3 3 5 5 7 7 9 —	10 ○	9 ○	8 ○	7 ○
5. 5 4 3 2 1 —	3 ○	2 ○	1 ○	0 ○
6. 14 13 12 11 10 —	8 ○	11 ○	10 ○	9 ○
7. 9 8 7 6 5 —	10 ○	2 ○	4 ○	6 ○
8. 1 0 2 0 3 —	4 ○	2 ○	3 ○	0 ○
9. $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$ —	$\frac{1}{9}$ ○	$\frac{1}{7}$ ○	$\frac{1}{1}$ ○	$\frac{1}{8}$ ○
10. 48 47 46 45 —	46 ○	49 ○	44 ○	52 ○
11. 5 2 6 2 7 2 8 —	9 ○	3 ○	6 ○	2 ○

12.	20 18 16 14 12 —	11 ◯	+	12 ◯		13 ◯	+	10 ◯
	15 18 21 24 27 —	28 ◯		29 ◯		30 ◯		26 ◯
14.	3 5 7 9 11 —	12 ◯		13 ◯		10 ◯		15 ◯
15.	15 12 9 6 —	1 ◯		3 ◯		2 ◯		4 ◯
16.	40 5 35 5 30 5 —	20 ◯		10 ◯		0 ◯		25 ◯
17.	4 6 5 7 6 —	7 ◯		6 ◯		5 ◯		8 ◯
18.	25 24 24 23 23 —	23 ◯		20 ◯		26 ◯		22 ◯
19.	54 45 36 27 18 —	0 ◯		19 ◯		9 ◯		22 ◯
20.	6 1 8 1 10 1 —	12 ◯		11 ◯		8 ◯		1 ◯
21.	12 13 15 18 22 —	27 ◯		29 ◯		25 ◯		24 ◯

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stan. score	*75*	*80*	*86*	*92*	*97*	*101*	*106*	*110*	*113*	*116*	*120*	*124*	*128*	*131*	*135*	*138*	*142*	*147*

Raw score	19	20	21
Stan. score	*152*	*160*	*167*

ANALOGIES

In each line pick out the word which belongs to the third word in the same way that the first two words belong together.

A.	hat : head — shoe :	foot	socks	boots
B.	winter : summer — cold :	warm	frost	ice

1.	people : houses — birds :	rivers	nests	fields
2.	woman : baby — cat :	puppy	house	kitten
3.	giant : dwarf — tall :	round	fat	short
4.	straw : hat — leather :	shoes	socks	table
5.	bed : sleeping — stove :	cooking	fuel	winter
6.	doctor : sickness — dentist :	lawyer	toothache	pain
7.	minute : hour — day :	week	Sunday	holiday
8.	clever : stupid — strong :	big	muscle	weak
9.	eyes : seeing — teeth :	swallowing	biting	tasting
10.	gun : shoot — knife :	sharpen	cut	steel
11.	bell : fire engine — horn :	automobile	engine	orchestra

12. child : adult — lamb :	baby	wool	sheep
13. friend : enemy — peace :	army	guns	war
14. old : new — December :	June	January	August
15. cargo : boat — freight :	horse	train	yacht
16. ruler : length — clock :	time	alarm	distance
17. drawer : desk — shelf :	ledge	bookcase	room
18. spyglass : see — telephone :	hear	telegraph	radio
19. book : writer — picture :	artist	painting	teacher
20. baby : man — colt :	cow	cattle	horse
21. corn : hog — bread :	tiger	fish	man
22. hungry : eat — lose :	sorry	search	loose
23. airplane : air — submarine :	ship	beneath	water
24. butter : bread — milk :	cereal	cow	supper
25. leaves : trees — grass :	flowers	earth	green

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Stan. score	*69*	*76*	*81*	*84*	*87*	*90*	*94*	*98*	*104*	*108*	*110*	*114*	*118*	*122*	*126*	*129*	*132*	*136*	*140*	*143*

Raw score	21	22	23	24	25
Stan. score	*148*	*152*	*158*	*169*	*179*

OPPOSITES

In each line mark the word that means just the *opposite* of the first word.

A. black —	dark ○	light ○	white ○	night ○
B. down —	below ○	high ○	top ○	up ○

---

1. fast —	slow ○	careful ○	quick ○	driving ○
2. hard —	soft ○	kind ○	rough ○	strong ○
3. clean —	dirty ○	spotless ○	noise ○	house ○
4. strong —	big ○	weak ○	men ○	small ○
5. young —	antique ○	youth ○	little ○	old ○
6. quiet —	cool ○	still ○	soft ○	noisy ○
7. find —	keep ○	drop ○	lose ○	discover ○
8. bitter —	bite ○	acrid ○	medicine ○	sweet ○
9. sharp —	music ○	dull ○	pointed ○	quick ○
10. high —	up ○	down ○	low ○	mountain ○
11. rough —	soft ○	even ○	cruel ○	smooth ○

12. wild —	cultivate	savage	peace	tame
13. throw —	toss	through	catch	ball
14. noise —	clamor	silence	loud	naïve
15. easy —	simple	difficult	soft	able
16. break —	stop	beak	fracture	mend
17. short —	big	little	near	long
18. part —	divide	close	fraction	whole
19. saucy —	rude	fragrant	polite	silly
20. agile —	clumsy	stealthy	nimble	curved
21. son —	daughter	mother	father	child
22. frolic —	pain	work	gastric	fun

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stan. score	*80*	*86*	*91*	*96*	*100*	*104*	*107*	*109*	*112*	*114*	*117*	*120*	*122*	*125*	*128*	*131*	*134*	*139*

Raw score	19	20	21	22
Stan. score	*144*	*153*	*164*	*180*

LOGICAL SELECTION

In each line mark the one word that tells what the first word always has.

A. child —	teacher	dress	head	toys
B. pail —	iron	water	milk	bottom

---

1. dinner —	food	milk	tea	ice cream
2. automobile —	wheels	trunks	radio	passengers
3. tree —	roots	nuts	apples	cherries
4. knife —	wood	blade	steel	point
5. bird —	nest	nose	teeth	wings
6. river —	sand	bridges	fish	water
7. apple —	sweetness	basket	skin	fruit
8. chair —	paint	arms	rockers	seat
9. picnic —	bathing	food	games	woods
10. elephant —	tusks	rider	trunk	trainer
11. city —	subways	parks	mountains	buildin

12. meadow — flowers ○ + trees ○ cows ○ + grass ○

13. airplane — radio ○ pilot ○ wings ○ compass ○

14. orchestra — violins ○ instruments ○ drums ○ conductor ○

15. telegram — paper ○ message ○ messenger ○ greeting ○

16. clock — glass ○ key ○ legs ○ face ○

17. factory — whistle ○ workmen ○ engines ○ machines ○

18. chain — hooks ○ snaps ○ iron ○ links ○

19. rubber — blackness ○ buoyancy ○ elasticity ○ gum ○

20. ship — deck ○ engines ○ sails ○ lifeboat ○

21. farm — land ○ barns ○ wheat ○ horses ○

22. umbrella — rain ○ ribs ○ handle ○ decorations ○

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stan. score	*77*	*84*	*88*	*93*	*98*	*103*	*107*	*110*	*114*	*118*	*121*	*122*	*128*	*132*	*136*	*142*	*149*	*156*

Raw score	19	20	21	22
Stan. score	*164*	*171*	*178*	*184*

ARITHMETIC REASONING

Work out each problem below, and if your answer is correct you will find it among the three possible answers given. Put a cross in the box below the right answer.

A. A nickel and a dime make —

10 cents	15 cents	25 cents
○	○	○

B. If you have 5 cents and get 3 more cents, then you will have —

8 cents	10 cents	7 cents
○	○	○

---

1. John bought a top for 20 cents and some marbles for 5 cents. All together he spent —

15 cents	20 cents	25 cents
○	○	○

2. How many cents do 2 nickels make?

10 cents	5 cents	12 cents
○	○	○

3. If you have 5 pencils and are given 2 more, you will then have —

7 pencils	3 pencils	6 pencils
○	○	○

4. If you have a nickel and spend 3 cents, you will have left —

4 cents	2 cents	3 cents
○	○	○

5. The teacher had ten apples. She gave half of them to James and half to John. Each boy had —

5 apples	6 apples	4 apples
○	○	○

6. If you bought something for 8 cents and gave the man 10 cents, how much change should you get back?

5 cents	3 cents	2 cents
○	○	○

7. Mary had a nickel and gave 2 cents to her sister. How much had she left?

7 cents	3 cents	4 cents
○	○	○

8. If you buy two toys at 3 cents each, they will cost —

8 cents	6 cents	5 cents
○	○	○

9. Mother had 10 apples, but she used one half of them to make a pie. How many did she have left?

5 apples	6 apples	4 apples
○	○	○

10. Mother had 14 pennies and she gave half of them to Mary. How many did Mary get?

6 pennies	8 pennies	7 pennies
○	○	○

11. John wants to earn a dollar. He has so far got 75 cents. How much more does he need to make a dollar?

a dime	20 cents	25 cents
○	○	○

12. Donald weighs 55 pounds and Richard weighs 39 pounds. What is the difference in their weight?

6 pounds	16 pounds	11 pounds
○	○	○

13. Father had 18 chicks and divided them equally among Mary, Jane, and Ellen. How many would each of them get?

4 chicks	5 chicks	6 chicks
○	○	○

14. If a sack of sugar weighs 4 pounds, how much will 2 sacks weigh?

8 pounds ○ 10 pounds ○ 6 pounds ○

15. We drove 360 miles on Saturday, 38 miles on Sunday, and 162 miles on Monday. How far did we drive all together?

460 miles ○ 560 miles ○ 550 miles ○

16. John bought 6 notebooks for 7 cents each. He gave the storekeeper half a dollar. How much change did he get back?

7 pennies ○ 8 pennies ○ 6 pennies ○

17. John bought a ball for 8 cents and a toy airplane for 12 cents. How much did he spend?

3 dimes ○ a quarter ○ 2 dimes ○

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stan. score	*68*	*75*	*83*	*88*	*93*	*98*	*102*	*105*	*108*	*112*	*116*	*120*	*122*	*130*	*138*	*148*	*168*

9.

10.

11.

12.

13.

14.

15.

16.

17.

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stan. score	*46*	*54*	*58*	*64*	*70*	*76*	*82*	*89*	*96*	*103*	*111*	*120*	*129*	*139*	*150*	*161*	*170*

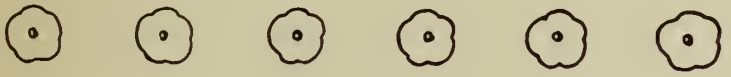
ARITHMETIC REASONING

A.

1.

2.

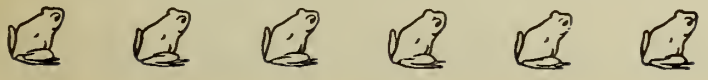
3.

4. 

5.

6.

7.

8. 

LOGICAL SELECTION

Sample.

A. Yes ○ No ○

1. Yes ○ No ○
2. Yes ○ No ○
3. Yes ○ No ○
4. Yes ○ No ○

5. Yes ○ No ○
6. Yes ○ No ○
7. Yes ○ No ○
8. Yes ○ No ○
9. Yes ○ No ○
10. Yes ○ No ○

11. Yes ○ No ○
12. Yes ○ No ○
13. Yes ○ No ○
14. Yes ○ No ○
15. Yes ○ No ○

16. Yes ○ No ○
17. Yes ○ No ○
18. Yes ○ No ○
19. Yes ○ No ○
20. Yes ○ No ○
21. Yes ○ No ○

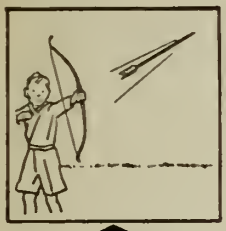
22. Yes ○ No ○
23. Yes ○ No ○
24. Yes ○ No ○
25. Yes ○ No ○
26. Yes ○ No ○

27. Yes ○ No ○
28. Yes ○ No ○
29. Yes ○ No ○
30. Yes ○ No ○
31. Yes ○ No ○
32. Yes ○ No ○

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Stan. score	*58*	*59*	*60*	*61*	*64*	*68*	*70*	*72*	*74*	*76*	*78*	*80*	*83*	*89*	*93*	*98*	*102*	*105*	*108*	*111*	*118*

Raw score	22	23	24	25	26	27	28	29	30	31	32
Stan. score	*121*	*128*	*134*	*141*	*148*	*156*	*164*	*170*	*178*	*184*	*190*

15.



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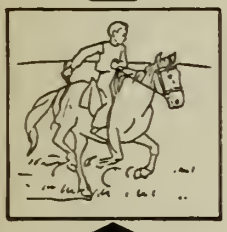
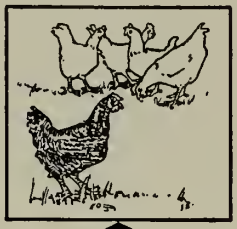


Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stan. score	*81*	*87*	*92*	*95*	*98*	*100*	*102*	*103*	*104*	*106*	*110*	*114*	*120*	*128*	*141*	*167*

10.

11.



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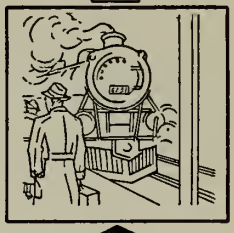

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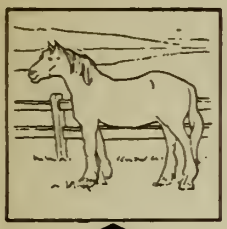
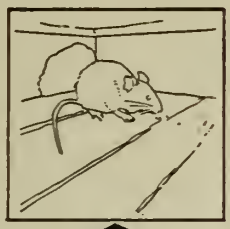

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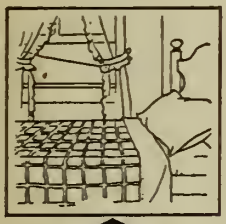
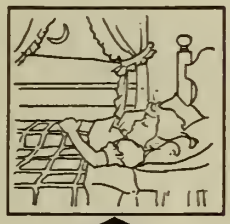

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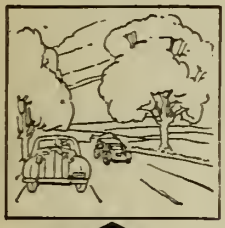
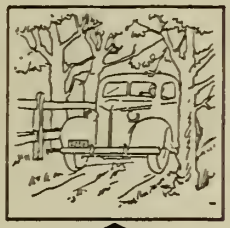

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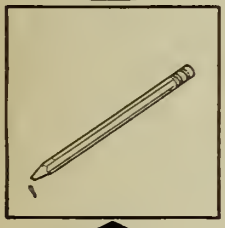

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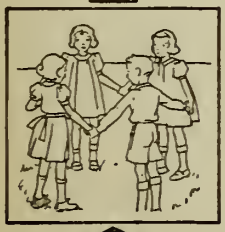
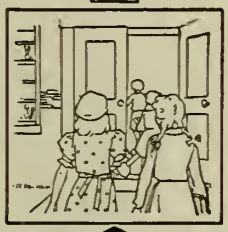
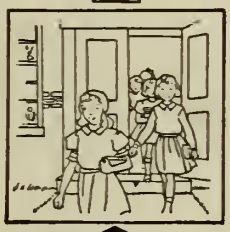

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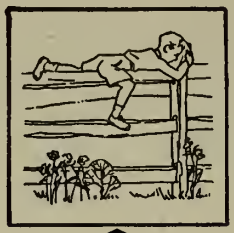
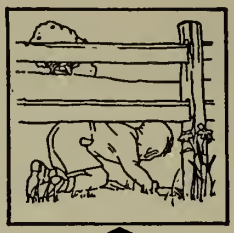

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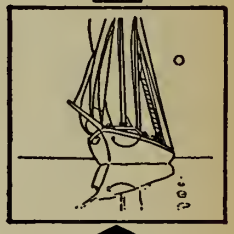

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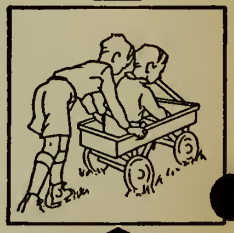

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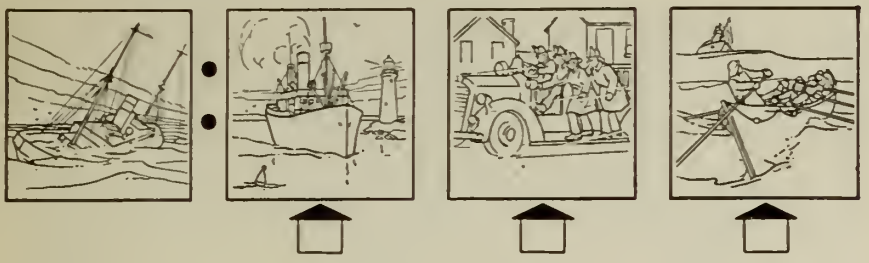

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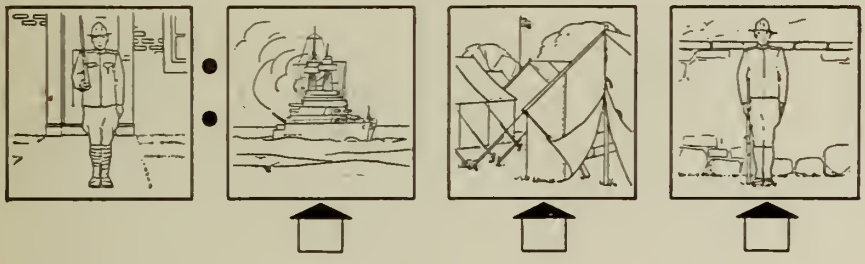

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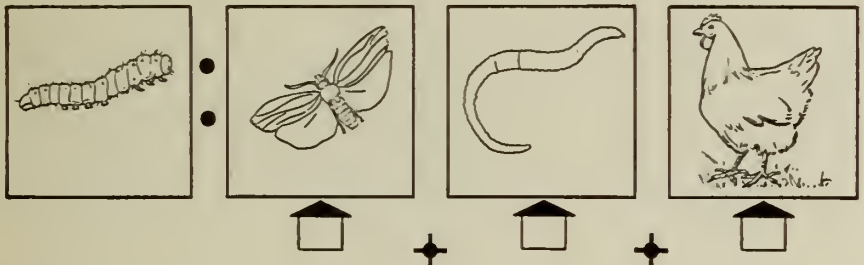

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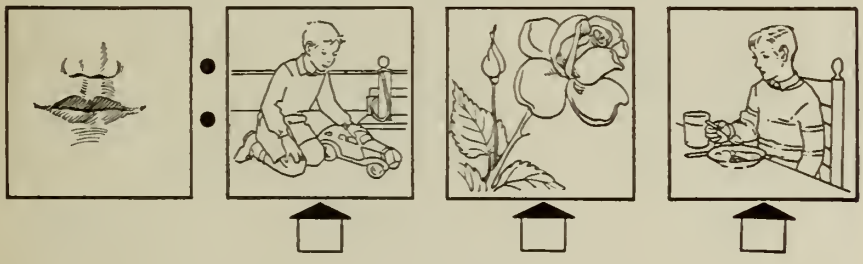

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stan. score	*62*	*69*	*78*	*87*	*95*	*102*	*108*	*112*	*116*	*120*	*125*	*130*	*135*	*142*	*149*	*157*	*165*

9.

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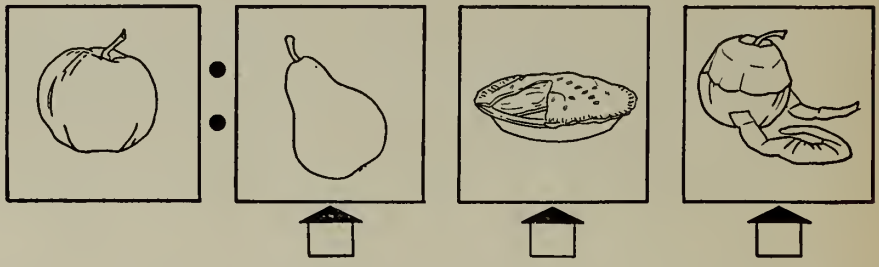

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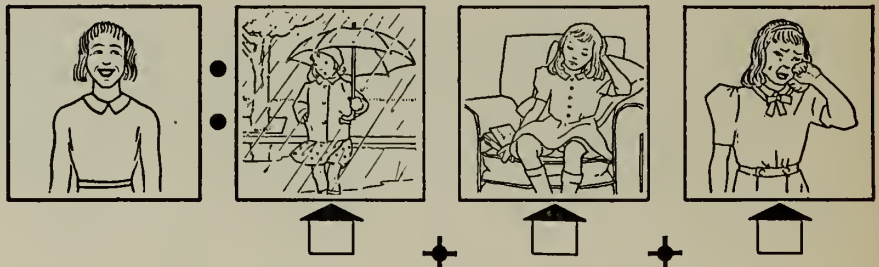

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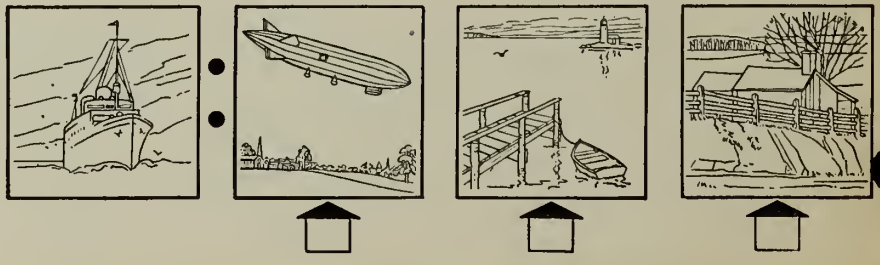

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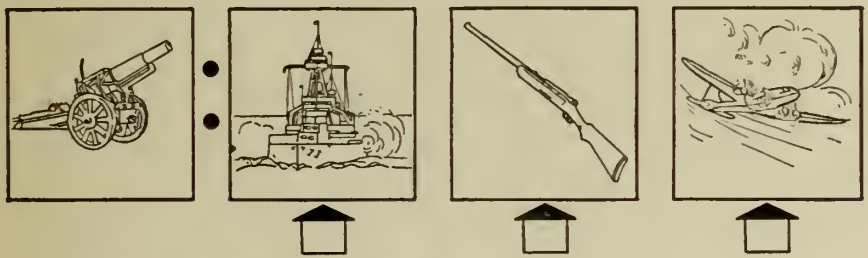

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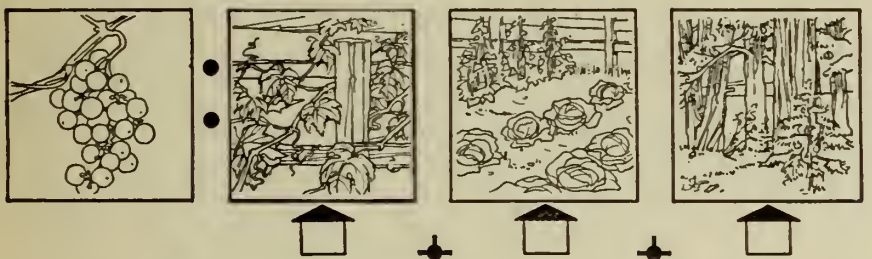

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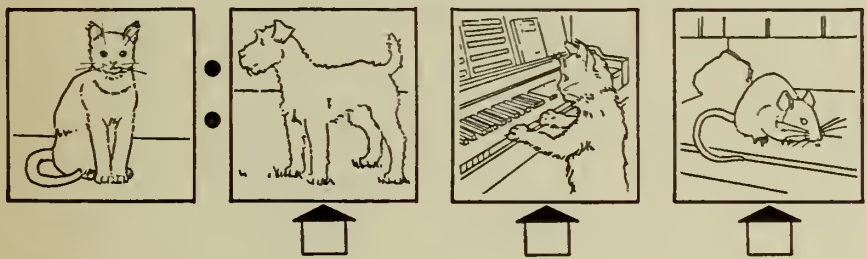

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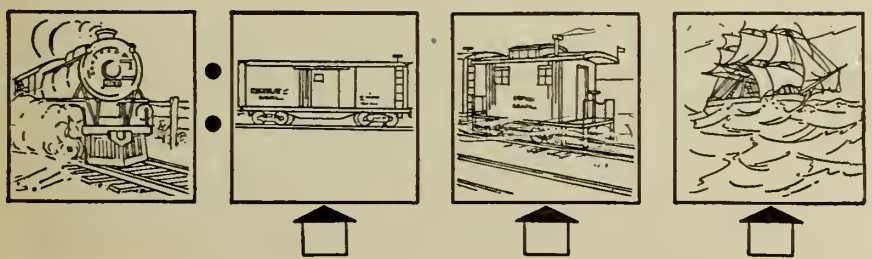

ANALOGIES

A.

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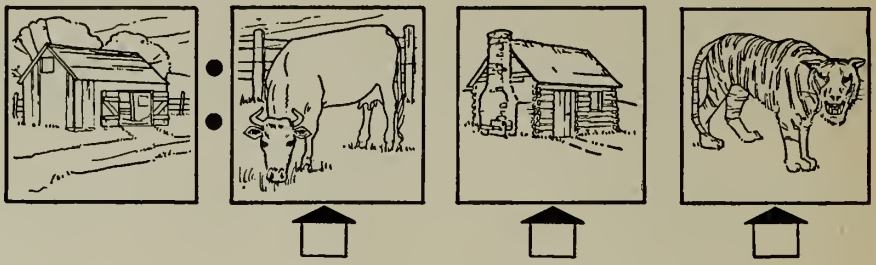

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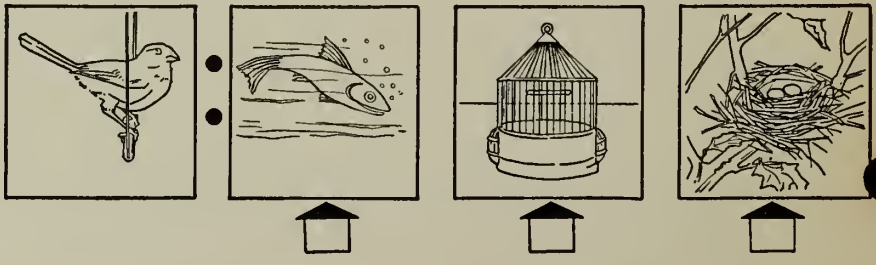
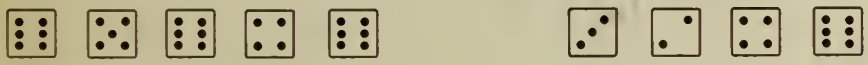
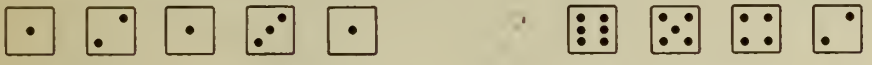
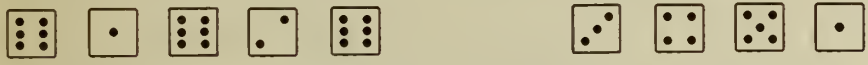
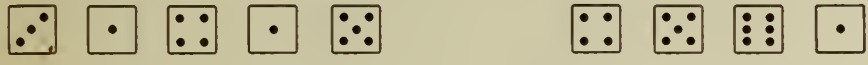


11. 

12. 

13. 

14. 

15.

16.

17.

18.

19.

Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stan. score	*87*	*96*	*103*	*111*	*117*	*120*	*123*	*126*	*129*	*133*	*135*	*138*	*142*	*148*	*153*	*158*	*165*

Raw score	18	19
Stan. score	*174*	*180*

NUMBER SEQUENCE

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B.

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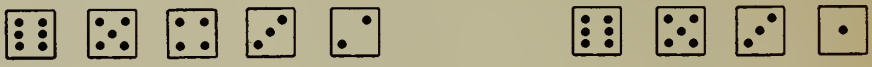
1. 
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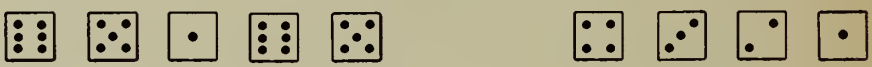
5. 
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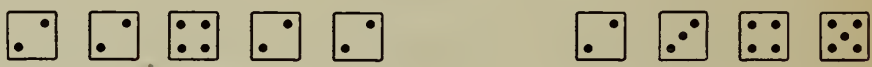
7. 
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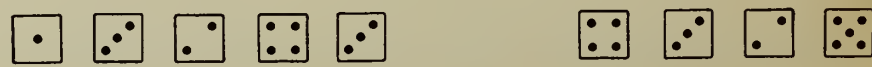
10. 

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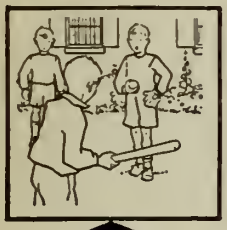

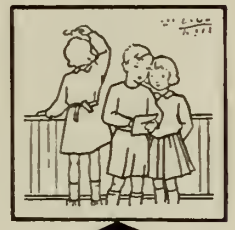

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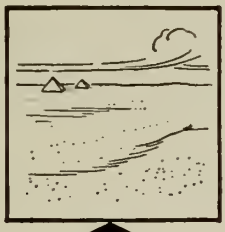

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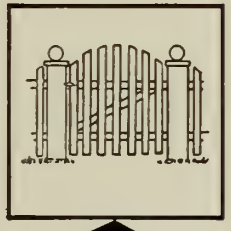
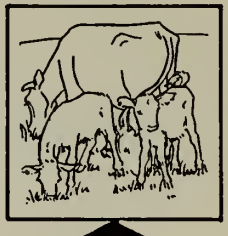


Raw score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stan. score	*56*	*60*	*64*	*68*	*75*	*83*	*88*	*92*	*101*	*108*	*114*	*121*	*128*	*135*	*143*	*154*	*171*

9.

10.

11.



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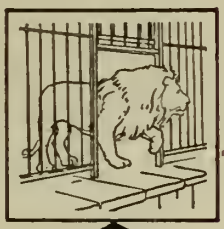
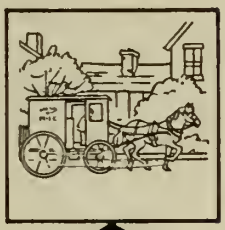

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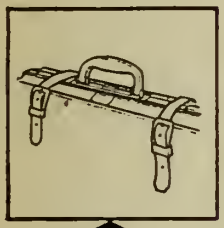

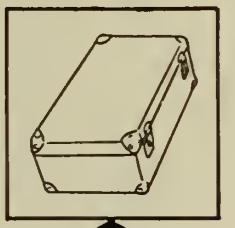

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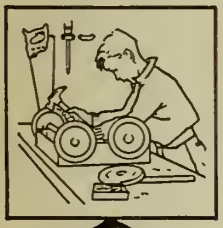

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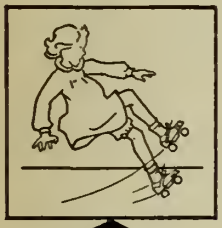

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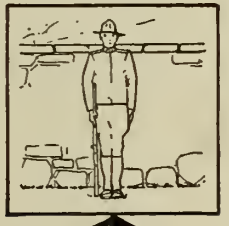
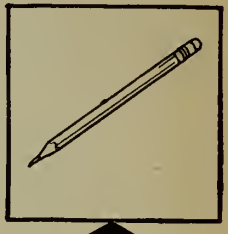


VOCABULARY

A.

B.



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PINTNER GENERAL ABILITY TESTS: VERBAL SERIES

Pintner-Durost Elementary Test

By RUDOLF PINTNER, PH.D.
Professor of Educational Psychology, Teachers College, Columbia University

and WALTER N. DUROST, PH.D.
Formerly Research Associate, Institute of School Experimentation
Teachers College, Columbia University

A

Non-Reading

Name..... Sex.....

Age....years....months Date of birth.....

Grade..... Teacher.....

Date of test.....19....

School.....

City..... State.....

Examiner.....

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RECORD BOOKLET — *Form L*

FOR THE REVISED STANFORD-BINET SCALE

as described in Terman and Merrill's Measuring Intelligence

No.....

Series.....

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Name..... Examiner..... C.A.....

Sex..... Birthdate..... Date..... M.A.....

School..... Grade..... I.Q.....

Parent..... Address.....

Birthplace..... of father..... of mother.....

Occupation of father..... of mother.....

Race..... Nationality of descent.....

TEST BEHAVIOR

Willingness	enthusiastic eagerness	enters actively into task	normal attitude because proper	disagreeable task	active objection
Self-confidence	extremely self-confident; relies on own ability	rather self-confident	neither distrustful nor entirely self-reliant	inclined to distrust own ability	extremely lacking in self-confidence; constantly distrustful of own ability
Social confidence	perfectly assured in personal contacts	rather confident	normal for age	rather shy	shy, reserved, reticent
Attention	completely absorbed by task	little interference from distracting stimuli	normal; attention to outside stimuli does not impair efficiency	easily distracted by extraneous stimuli or by own ideas, but returns readily to task	abstracted; difficult to get and hold attention

TEST SUMMARY

Yrs.	Mos.	Yrs.	Mos.	Yrs.	Mos.
II.....	.....	VI.....	.....	XIII.....	.....
II–6.....	.....	VII.....	.....	XIV.....	.....
III.....	.....	VIII.....	.....	A.A.....	.....
III–6.....	.....	IX.....	.....	S.A.I.....	.....
IV.....	.....	X.....	.....	S.A. II.....	.....
IV–6.....	.....	XI.....	.....	S.A. III.....	.....
V.....	.....	XII.....	.....	_____	_____
Time.....				Total.....	.....

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BOSTON · NEW YORK · CHICAGO · DALLAS · ATLANTA · SAN FRANCISCO

The Riverside Press Cambridge

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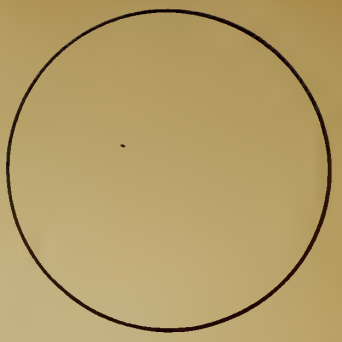


YEAR II (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1.*Three-hole form board (1+) *a*) *b*)

☐ 2. Identifying objects by name (4+)

a) Kitty *b*) Button *c*) Thimble *d*) Cup *e*) Engine *f*) Spoon

☐ 3.*Identifying parts of the body (same as II–6, 2) (3+)

a) Hair *b*) Mouth *c*) Ears *d*) Hands

☐ 4. Block building: Tower

☐ 5.*Picture vocabulary (same as II–6, 4; III, 2; III–6, 2; IV, 1) (2+)

1. Shoe	4. Bed	7. Table	10. Basket	13. Tree	16. Pocket knife
2. Clock	5. Scissors	8. Hand	11. Glasses	14. Cup	17. Stool
3. Chair	6. House	9. Fork	12. Gun	15. Umbrella	18. Leaf

☐ 6.*Word combinations

Alternate. Obeying simple commands (same as III–6, 1) (2+)

Mos._____

YEAR II–6 (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1.*Identifying objects by use (same as III–6, 5) (3+)

a) Cup *b*) Shoe *c*) Penny *d*) Knife *e*) Automobile *f*) Iron

☐ 2. Identifying parts of the body (same as II, 3) (4+)

☐ 3.*Naming objects (4+)

a) Chair *b*) Automobile *c*) Box *d*) Key *e*) Fork

☐ 4.*Picture vocabulary (same as II, 5; III, 2; III–6, 2; IV, 1) (9+)

☐ 5.*Repeating 2 digits (1+)

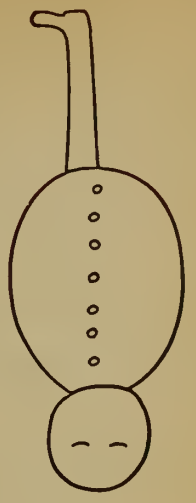
a) 4–7_____ *b*) 6–3_____ *c*) 5–8_____

☐ 6. Three-hole form board: Rotated (II, 1 must precede) (1+) *a*) *b*)

Alternate. Identifying objects by name (same as II, 2) (5+)

Mos._____

Note. — The tests marked with a * constitute an abbreviated scale, for use in case there is not time to give a complete test. See page 31 of "Measuring Intelligence."



YEAR III (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1. Stringing beads (4+) (2 min.) No. strung.....

☐ 2.*Picture vocabulary (same as II, 5; II–6, 4; III–6, 2; IV, 1) (12+)

☐ 3.*Block building: Bridge

☐ 4.*Picture memories (1+) *a)* *b)*

☐ 5. Copying a circle (1+) *a)* *b)* *c)*

☐ 6.*Repeating 3 digits (1+)

a) 6–4–1..... *b)* 3–5–2..... *c)* 8–3–7.....

Alternate. Three-hole form board: Rotated (same as II–6, 6) (2+)

Mos......

YEAR III–6 (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1.*Obeying simple commands (3+)

a) *b)* *c)*

☐ 2.*Picture vocabulary (same as II, 5; II–6, 4; III, 2; IV, 1) (15+)

☐ 3. Comparison of sticks (3 of 3, or 5 of 6)

a) *b)* *c)* *d)* *e)* ***f)***

☐ 4. Response to pictures I (2+)

a) Dutch Home

b) Canoe

c) Postoffice

☐ 5.*Identifying objects by use (same as II–6, 1) (5+)

☐ 6.*Comprehension I (1+)

a) ***b)***

Alternate. Drawing a cross

Mos......

YEAR IV (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1. *Picture vocabulary (same as II, 5; II–6, 4; III, 2; III–6, 2) (16+)

☐ 2. *Naming objects from memory (2+) *a)* *b)* *c)*

☐ 3. Picture completion: Man (same as V, 1) (1 point)

☐ 4. *Pictorial identification (3+)

a) Stove *b)* Umbrella *c)* Cow *d)* Rabbit *e)* Moon *f)* Cat

☐ 5. *Discrimination of forms (8+) No. correct.....

☐ 6. Comprehension II (2+)

a) *b)*

Alternate. Memory for sentences I (1+)

a) We are going to buy some candy for mother.

b) Jack likes to feed the little puppies in the barn.

Mos......

YEAR IV-6 (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1. Aesthetic comparison (3+) *a)* *b)* *c)*

☐ 2. *Repeating 4 digits (1+)

a) 4–7–2–9..... *b)* 3–8–5–2..... *c)* 7–2–6–1.....

☐ 3. *Pictorial likenesses and differences (same as VI, 5) (3+)

a) *b)* *c)* *d)* *e)*

☐ 4. Materials (2+) *a)* Chair *b)* Dress *c)* Shoe

☐ 5. *Three commissions (3+) *a)* *b)* *c)*

☐ 6. *Opposite analogies I (same as VII, 5) (2+)

a) *b)* *c)* *d)* *e)*

Alternate. Pictorial identification (same as IV, 4) (4+)

Mos......

YEAR V (6 tests, 1 month each; or 4 tests, 1½ months each)

☐ 1. *Picture completion: Man (same as IV, 3) (2 points)

☐ 2. Paper folding: Triangle

☐ 3. *Definitions (2+)

a) Ball *b)* Hat *c)* Stove

☐ 4. Copying a square (1+) *a)* *b)* *c)*

☐ 5. *Memory for sentences II (1+)

a) Jane wants to build a big castle in her playhouse.

b) Tom has lots of fun playing ball with his sister.

☐ 6. *Counting four objects (2+) *a)* *b)* *c)*

Alternate. Knot

Mos......

(There is no heading *V–6* and there are only six months of credit between the headings *Year V* and *Year VI* because each group of tests covers the period immediately preceding its age heading, in this case the period from *Year IV–6 to Year V.*)

YEAR VI (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. *Vocabulary (5+) No. words.....

☐ 2. *Copying a bead chain from memory I (2 min.)

☐ 3. Mutilated pictures (4+)

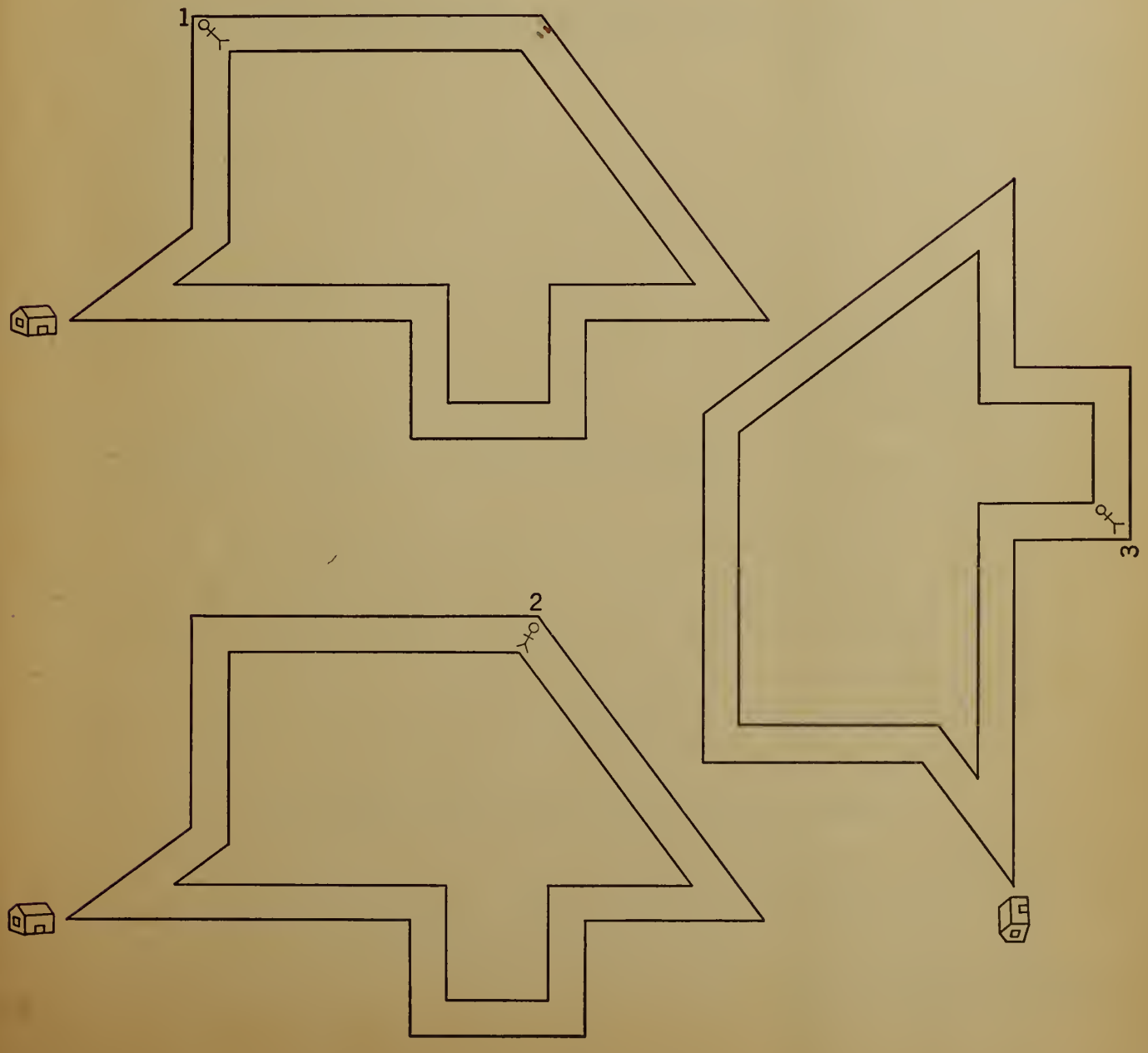
a) *b)* *c)* *d)* *e)*

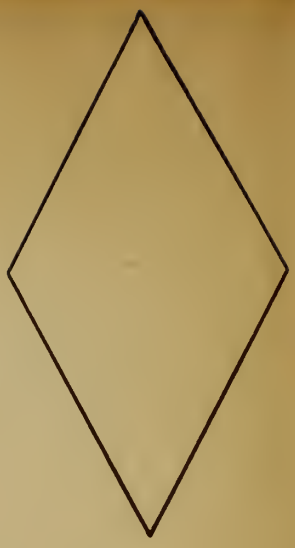
☐ 4. *Number concepts (3+) *a)* *b)* *c)* *d)*

☐ 5. *Pictorial likenesses and differences (same as IV–6, 3) (5+)

☐ 6. Maze tracing (2+) *a)* *b)* *c)*

Mos......





YEAR VII (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. Picture absurdities I (3+)
a)

b)

c)

d)

☐ 2. *Similarities: Two things (2+)
a) Wood and coal
b) Apple and peach
c) Ship and automobile
d) Iron and silver

☐ 3. *Copying a diamond (2+) *a*) *b*) *c*)

☐ 4. Comprehension III (2+)
a)
b)
c)

☐ 5. *Opposite analogies I (same as IV–6, 6) (5+)
a) *b*) *c*) *d*) *e*)

☐ 6. *Repeating 5 digits (1+)
a) 3–1–8–5–9..... *b*) 4–8–3–7–2..... *c*) 9–6–1–8–3.....

Mos......

YEAR VIII (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. *Vocabulary (8+) No. words.....

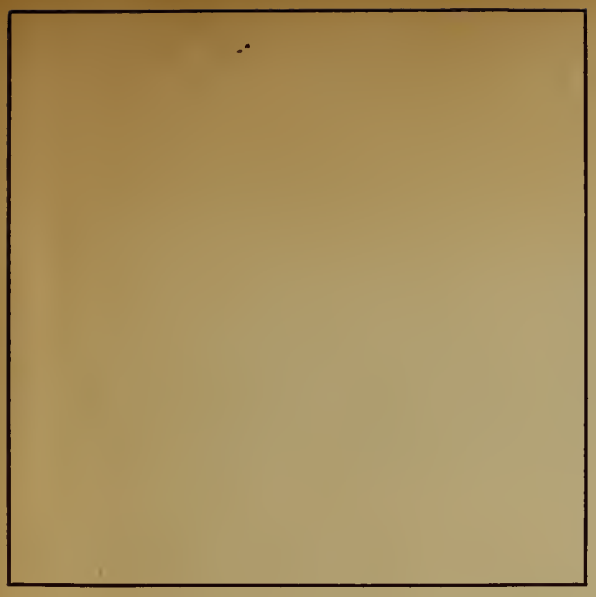
☐ 2. Memory for stories: The Wet Fall (5+)
a) ..... *b*)..... *c*)..... *d*).....
e) ..... *f*).....

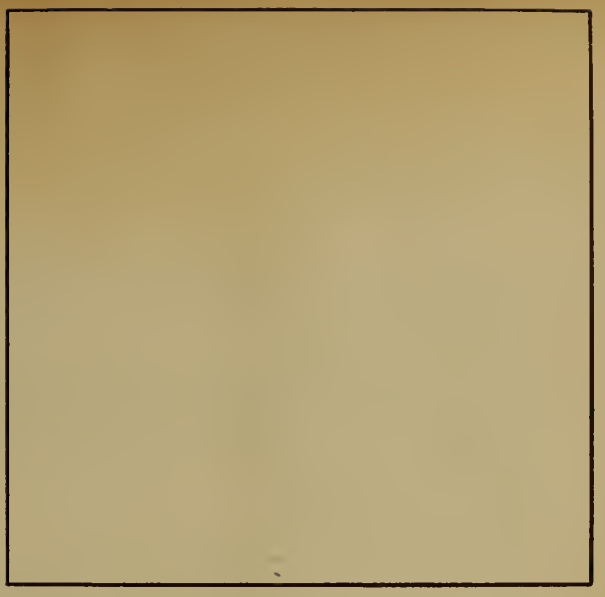
☐ 3. *Verbal absurdities I (3+)
a)

b)

c)

d)





YEAR VIII (*Continued*)

☐ 4. *Similarities and differences (3+)

a) Baseball — orange

b) Aeroplane — kite

c) Ocean — river

d) Penny — quarter

☐ 5. *Comprehension IV (2+)

a)

b)

c)

☐ 6. Memory for sentences III (1+)

a) Fred asked his father to take him to see the clowns in the circus.

b) Billy has made a beautiful boat out of wood with his sharp knife.

Mos......

YEAR IX (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. Paper cutting I (same as XIII, 3) (1+) *a*) *b*)

☐ 2. Verbal absurdities II (same as XII, 2) (3+)

a)

b)

c)

d)

e)

☐ 3. *Memory for designs (same as XI, 1) (1+ or 2 with ½ credit each)

a) *b*)

☐ 4. *Rhymes: New form (3+)

a) *b*) *c*) *d*)

☐ 5. *Making change (2+)

a) 10–4..... *b*) 15–12..... *c*) 25–4.....

☐ 6. *Repeating 4 digits reversed (1+)

a) 8–5–2–6..... *b*) 4–9–3–7..... *c*) 3–6–2–9.....

Mos......

YEAR X (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1.*Vocabulary (11+) No. words.....

☐ 2. Picture absurdities II — Frontier Days

☐ 3.*Reading and report (35 seconds, 2 errors, 10 memories)

Memories..... Time for reading..... Mistakes.....

New York | September | 5th. | A fire | last night | burned | several houses | near the center | of the city. | It took some time | to put it out. | The loss | was fifty thousand | dollars, | and seventeen | families | lost their homes. | In saving | a girl | who was asleep | in bed, | a fireman | was burned | on the hands.

☐ 4.*Finding reasons I (2+)

a)

b)

☐ 5.*Word naming (28 words in one minute)

☐ 6. Repeating 6 digits (1+)

a) 4–7–3–8–5–9..... *b*) 5–2–9–7–4–6..... *c*) 7–2–8–3–9–4.....

Mos......

YEAR XI (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1.*Memory for designs (same as IX, 3) (1½+)

☐ 2.*Verbal absurdities III (2+)

a)

b)

c)

☐ 3.*Abstract words I (3+)

a) Connection
b) Compare
c) Conquer
d) Obedience
e) Revenge

☐ 4. Memory for sentences IV (1+)

a) At the summer camp the children get up early in the morning to go swimming.
b) Yesterday we went for a ride in our car along the road that crosses the bridge.

☐ 5. Problem situation

☐ 6.*Similarities: Three things (3+)

a) Snake — cow — sparrow
b) Rose — potato — tree
c) Wool — cotton — leather
d) Knifeblade — penny — piece of wire
e) Book — teacher — newspaper

Mos......

YEAR XII (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. *Vocabulary (14+) No. words.....

☐ 2. *Verbal absurdities II (same as IX, 2) (4+)

☐ 3. Response to pictures II: Messenger Boy

☐ 4. Repeating 5 digits reversed (1+)

a) 8–1–3–7–9..... *b*) 6–9–5–8–2..... *c*) 5–2–9–4–1.....

☐ 5. *Abstract words II (same as XIV, 6) (2+)

a) Constant
b) Courage
c) Charity
d) Defend

☐ 6. *Minkus completion (same as S.A. I, 3) (2+) (5 min.)

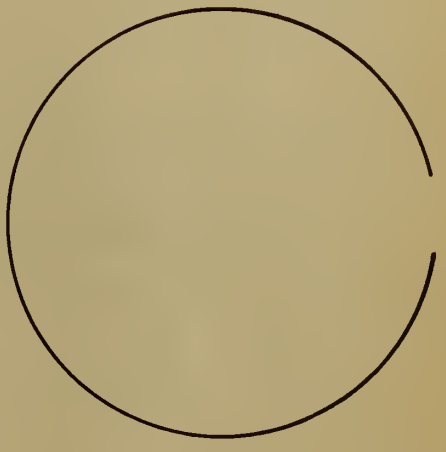
Mos.....

YEAR XIII (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. Plan of search

☐ 2. Memory for words (1+)

a) Cow, sand, glass, chair, bell.
b) Grace, truth, worth, peace, doubt.



☐ 3. *Paper cutting I (same as IX, 1) (2+)

☐ 4. *Problems of fact (2+)

a)
b)
c)

☐ 5. *Dissected sentences (2+) (1 min. ea.)

a)
b)
c)

☐ 6. *Copying a bead chain from memory II (2 min.)

Mos.....

YEAR XIV (6 tests, 2 months each; or 4 tests, 3 months each)

☐ 1. *Vocabulary (16+) No. words.....

☐ 2. *Induction *a*) *b*) *c*) *d*) *e*) *f*) Rule:

☐ 3. Picture absurdities III: The Shadow

☐ 4. *Ingenuity (same as A.A., 6) (1+) (3 min. ea.)

a)
b)
c)

☐ 5. Orientation: Direction I (3+) *a*) *b*) *c*) *d*) *e*)

☐ 6. *Abstract words II (same as XII, 5) (3+)

Mos.....

HURRY

COME TO LONDON

HURRY

DPNF UP MPOEPO

COME TO LONDON

AVERAGE ADULT (8 tests, 2 months each; or 4 tests, 4 months each)

☐ 1. *Vocabulary (20+) No. words.....

☐ 2. *Codes (1½+) (3 min. ea.) *a*) *b*)

☐ 3. *Differences between abstract words (2+)

a) Laziness and idleness

b) Poverty and misery

c) Character and reputation

☐ 4. Arithmetical reasoning (2+) (1 min. ea.) *a*) *b*) *c*)

☐ 5. Proverbs I (2+)

a)

b)

c)

☐ 6. *Ingenuity (same as XIV, 4) (2+) (3 min. ea.)

☐ 7. Memory for sentences V (1+)

a) The red-headed woodpeckers made a terrible fuss as they tried to drive the young away from the nest.

b) The early settlers had little idea of the great changes that were to take place in this country.

☐ 8. Reconciliation of opposites (same as S.A. II, 5) (3+)

a) Heavy — light

b) Tall — short

c) Sick — well

d) More — less

e) Outside — inside

f) Asleep — awake

Mos......

SUPERIOR ADULT I (6 tests, 4 months each; or 4 tests, 6 months each)

☐ 1. *Vocabulary (23+) No. words.....

☐ 2. Enclosed box problem (3+) *a*) *b*) *c*) *d*)

☐ 3. *Minkus completion (same as XII, 6) (3+) (5 min.)

☐ 4. *Repeating 6 digits reversed (1+)

a) 4–7–1–9–5–2..... *b*) 5–8–3–6–9–4..... *c*) 7–5–2–6–1–8.....

☐ 5. *Sentence building (2+)

a) Benefactor — institution — contribution

b) Civility — requirement — employee

c) Attainment — fortune — misery

☐ 6. Essential similarities (2+)

a) Farming and manufacturing

b) Melting and burning

c) An egg and a seed

Mos......

SUPERIOR ADULT II (6 tests, 5 months each; or 4 tests, 7½ months each)

☐ 1. *Vocabulary (26+) No. words.....

☐ 2. *Finding reasons II (2+)

a)

b)

☐ 3. *Repeating 8 digits (1+)

a) 7–2–5–9–4–8–3–6..... *b*) 4–7–1–5–3–9–6–2..... *c*) 4–1–9–3–5–8–2–6.....

☐ 4. *Proverbs II (2+)

a)

b)

☐ 5. Reconciliation of opposites (same as A.A., 8) (5+)

☐ 6. Repeating thought of passage: Value of Life

Many opinions have been given on the value of life. | Some call it good, | others call it bad. | It would be nearer correct to say that it is mediocre, | for on the one hand our happiness is never as great as we should like, | and on the other hand our misfortunes are never as great as our enemies would wish for us. | It is this mediocrity of life which prevents it from being radically unjust.

Mos......

SUPERIOR ADULT III (6 tests, 6 months each; or 4 tests, 9 months each)

☐ 1. *Vocabulary (30+) No. words.....

☐ 2. *Orientation: Direction II (2+) *a*) *b*)

☐ 3. *Opposite analogies II (2+) *a*) *b*) *c*)

☐ 4. Paper cutting II

☐ 5. *Reasoning (5 min.)

☐ 6. Repeating 9 digits (1+)

a) 5–9–6–1–3–8–2–7–4..... *b*) 9–2–5–8–4–1–7–3–6..... *c*) 4–7–2–9–1–6–8–5–3.....

Mos......

MINKUS COMPLETION

a) One cannot always be a hero,_____one can always be a man.

b) The streams are dry,_____there has been little rain.

c) _____either of us could speak, we were at the bottom of the stairs.

d) He is_____well grounded in geography_____his brother,
_____he is not so quick in arithmetic.

VOCABULARY

Score_____

1. orange_____
2. envelope_____
3. straw_____
4. puddle_____
5. tap_____
6. gown_____
7. eyelash_____
8. roar_____
9. scorch_____
10. muzzle_____
11. haste_____
12. lecture_____
13. Mars_____
14. skill_____
15. juggler_____
16. brunette_____
17. peculiarity_____
18. priceless_____
19. regard_____
20. disproportionate_____
21. shrewd_____
22. tolerate_____
23. stave_____
24. lotus_____
25. bewail_____
26. repose_____
27. mosaic_____
28. flaunt_____
29. philanthropy_____
30. ochre_____
31. frustrate_____
32. incrustation_____
33. milksop_____
34. harpy_____
35. ambergris_____
36. piscatorial_____
37. depredation_____
38. perfunctory_____
39. limpet_____
40. achromatic_____
41. casuistry_____
42. homunculus_____
43. sudorific_____
44. retroactive_____
45. parterre_____

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